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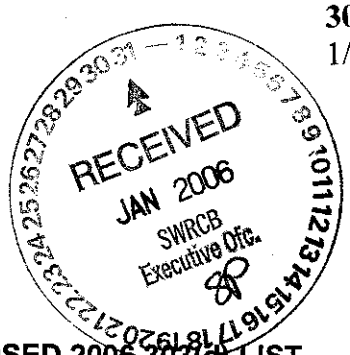
PUBLIC WORKS
DEPARTMENT

303 (d) Deadline:
1/31/06



January 30, 2006

Selica Potter, Acting Clerk to the Board
State Water Resources Control Board
Executive Office
1001 I Street, 24th Floor
Sacramento, CA 95814

SUBJECT: COMMENTS REGARDING THE PROPOSED 2006 303(d) LIST

Dear State Water Resources Control Board:

The City of Burbank Public Works Department appreciates the opportunity to comment on the State Water Resources Control Board's (State Board) 303(d) list of impaired waterbodies. The creation of the Listing Policy (Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List) has made the listing process much more transparent and straightforward. We applaud the implementation of the Listing Policy and the hard work by the State Board staff to review data in accordance with it.

Upon reviewing the proposed 2006 Clean Water Act 303(d) list, we were pleased to see that four delistings for the Burbank Western Channel were proposed. The fact sheets state that three of these delistings (algal growth, foam/scum, and odor) are proposed because these are ambient condition indicators caused by pollutants. In support of these delistings, a study was recently submitted to the Los Angeles Regional Water Quality Control Board for the Burbank Western Channel that confirms there are no beneficial use impairments caused by algae, scum/foam or odors (see Attachment 1). By all accounts, these delistings are justified.

The fourth proposed delisting for the Burbank Western Channel is cadmium. As stated in our comments during the 2002 listing process, this delisting is warranted by the lack of exceedances in this waterbody. Unfortunately, this delisting came after a Total Maximum Daily Load (TMDL) had already been created for this pollutant. This occurred due to the failure to delist this pollutant in the 2002 listing cycle, the failure to produce a 2004 303(d) list, and the failure to reevaluate the listing when the TMDL was being created. Therefore, although we are pleased with the proposed delisting of cadmium, we are frustrated that this has come too late to avoid the costs associated with the approved TMDL. Nevertheless, the proposed delisting of this pollutant is the proper action at this time.

In addition to these four proposed delistings, the Burbank Western Channel has six proposed new listings. Of these new listings, copper is the only proposed new listing that appears justified. During the review of relevant data during the TMDL for metals in the Los Angeles River and Tributaries, it became clear that dissolved copper concentrations (in the absence of site specific copper translators or copper water effect ratios) exceed standards. Therefore, this listing appears correct.

On the other hand, the other five proposed new listings for the Burbank Western Channel (ammonia, cyanide, fecal coliform, nitrite and zinc) do not seem to be justified. Specific comments on these proposed listings are detailed in the following pages.

1. Ammonia

- According to fact sheet, "this pollutant is being considered for listing under section 2.2 of the Listing Policy."

- Two lines of evidence are stated in the fact sheet.
  i. The first line of evidence, numeric, states that, "Numeric data generated from 27 samples taken from 5/7/02 to 5/25/04 at two to three monthly intervals. No sample exceeded the basin plan ammonia WQO." This line of evidence does not provide a basis for listing ammonia.
  ii. The second line of evidence is that a remedial program is in place. It is under this line of evidence that the listing is made.

Reasons that Ammonia is an Incorrect Listing

1. The requirements of section 3 of the listing policy have not been met. Section 2.2 of the listing policy states that:

> ***2.2 Water Quality Limited Segments Being Addressed***
> *Water segments shall be placed in this category if the conditions for placement in the water quality limited segments category (section 3) are met **and** either of the following conditions is met:*
>
> *1. A TMDL has been developed and approved by USEPA and the approved implementation plan is expected to result in full attainment of the standard within a specified time frame; or*
>
> *2. The RWQCB has determined in fact sheets that an existing regulatory program is reasonably expected to result in the attainment of the water quality standard within a reasonable, specified time frame.*
>
> ***Waters shall only be removed from this category if it is demonstrated in accordance with section 4 that water quality standards are attained.***
> (emphasis mine)

As made clear in the first line of evidence, the conditions for placement in the water quality limited segments category (section 3) **have not** been met. The section 3 listing factors which could apply are:

- Numeric water quality objectives – This condition fails since the fact sheet states that there is insufficient data to list based on an exceedance of water quality objectives.
- Nuisance – The nuisance related listings, algae, odors and scum/foam, for this segment are proposed for delisting as no impairment has been demonstrated. As mentioned previously, a recent study has demonstrated that nuisance conditions are not impairing beneficial uses.
- Trends – A review of the trend shows ammonia levels having decreased to levels within water quality objectives without any indication of upward trends.

Therefore, the first condition of section 2.2 has not been met and this listing is contrary to the listing policy.

2. The second condition of section 2.2 of the listing policy has not been met. Section 2.2 of the listing policy states that:

   Waters shall only be removed from this category if it is demonstrated in accordance with section 4 that water quality standards are attained.

   Section 4 describes the basis for which a segment can be de-listed. The section 4 delisting factor that has been met is section 4.2 which states:

   4.2 Numeric Water Quality Objectives for Conventional or Other Pollutants in Water
   Numeric water quality objectives for conventional pollutants are not exceeded as follows:

   • Using the binomial distribution, waters shall be removed from the section 303(d) list if the number of measured exceedances supports rejection of the null hypothesis as presented in Table 4.2.

   • The binomial distribution cannot be used to support a delisting with sample sizes less than 26.

   The analysis of samples taken from the Burbank Western Channel indicates that 29 of 33 samples meet the 2002 adopted water quality objectives (see Attachment 2). According to Table 4.2, a water body should be delisted for a conventional pollutant if there are 5 or less exceedances in a sample size of 33. Therefore, according to section 2.2 of the listing policy, this segment should be delisted because it meets the requirements of section 4 of the listing policy.

2. Cyanide

- According to fact sheet, "This pollutant is being considered for placement on the section 303(d) list under section 3.1 of the Listing Policy."

- One line of evidence is stated in the fact sheet.
  - The numeric line of evidence indicates the beneficial use as "MU - Municipal & Domestic."
  - The numeric line of evidence also states that, "Data generated from six samples out of which 2 samples exceeded the California Toxics Rule (CTR) Criteria Continuous Concentration guideline for the protection of aquatic life (LACDPW, 2003a)." It is upon this evidence that this segment is listed.
  - The fact sheet also states that:

    This conclusion is based on the staff findings that:
    1. The data used satisfies the data quality requirements of section 6.1.4 of the Policy.
    2. The data used satisfies the data quantity requirements of section 6.1.5 of the Policy.

<u>Reasons that Cyanide is an Incorrect Listing</u>

1. The listed beneficial use is incorrect. The beneficial use of MU (or MUN) does not apply to the Burbank Western Channel. Region IX of the U.S. Environmental Protection Agency ("EPA") sent a letter to the State Water Resources Control Board on February 15, 2002 which states that waters identified in Table 2-1 of the 1994 Los Angeles Basin Plan with an asterisk (*) do not have municipal and domestic supply use (MUN) as a designated use until such time as the State undertakes additional study and modifies its Basin Plan. At this time, no such study or Basin Plan modification has taken place.

2. The data analyzed to create the cyanide listing is questionable. The fact sheet states that there were six samples analyzed for cyanide in the Burbank Western Channel. These six samples were submitted by Los Angeles County Department of Public Works (LACDPW 2003a). The data submitted was as follows:

Appendix B. 2002-2003 Sampling Results for Burbank Western System

Tributary Monitoring

WEATHER CONDITION					Wet					Dry
STATION NO.					TS03	TS03	TS03	TS03	TS03	TS03
STATION NAME					Burbank Western	Burbank Western	Burbank Western	Burbank Western	Burbank Western	Burbank Western
EVENT NO.					0203-01	0203-02	0203-03	0203-04	0203-05	0203-02
DATE					11/08/2002	12/16/2002	02/11/2003	02/25/2003	03/15/2003	04/30/2003
	Sample Type	EPA Method	PQL	Units						
Conventional										
Oil and Grease	Grab	EPA413.1	1	mg/L	0	6.6	0	1.2	2.3	0
Total Phenols	Grab	EPA420.1	0.1	mg/L	0	0	0	0	0	0
Cyanide	Grab	EPA335.2	0.01	mg/L	0.009	0	0.0055	0	0	0

As this table indicates, the two samples that were considered exceedances (0.009 mg/L and 0.0055 mg/L) have values below the indicated PQL of 0.01 mg/L. The Practical Quantitation Limit, or PQL, is the lowest level at which the analyzing laboratory is able produce reliable and accurate results. Since the analyses of these two samples of cyanide is below the PQL, any results lower than the PQL should not be considered as credible information.

We discussed this problem with the Supervising Toxicologist for the Los Angeles County Laboratory Department of Agriculture Weights and Measures (LAC-DAWM). He stated that the reported PQL for cyanide (EPA335.2) is incorrect and should be 0.005 mg/L, which is less than the two results exceeding standards.

Other than cyanide, several other constituents were reported at levels below their indicated PQL. These constituents include: nitrate, antimony (total & dissolved), arsenic (total & dissolved), cadmium (total & dissolved), chromium (total & dissolved), and copper (total & dissolved). According to the LAC-DAWM, their standard PQLs are as follows:

Constituent	Method	Actual PQL	Units	*PQL reported**
Nitrate	SM4110B	0.1	mg/L	*0.5*
Antimony	EPA 200.8	0.5	µg/L	*5*
Arsenic	EPA 200.8	1	µg/L	*5*
Cadmium	EPA 200.8	0.25	µg/L	*1*
Chromium	EPA 200.8	0.5	µg/L	*5*
Copper	EPA 200.8	0.5	µg/L	*5*
Lead	EPA 200.8	0.5	µg/L	*5*
Nickel	EPA 200.8	0.5	µg/L	*5*
Selenium	EPA 200.8	1	µg/L	*5*
Silver	EPA 200.8	0.25	µg/L	*1*

**PQLs reported in the data table received by the SWRCB.*

Additionally, the method reference for total and fecal coliform is incorrect for the data submitted. The total coliform and fecal coliform samples were analyzed by SM9221B and SM9221E, respectively. The listed EPA method of SM9230B is incorrect.

The many inconsistencies in the PQLs and method references call into question the accuracy of the data submitted by LACDPW for the Burbank Western Channel. Unfortunately, the original laboratory reports for the analyses are not available and therefore, the analytical results are unable to be verified. The number of errors in the found in the reviewable portion of the

table seems to indicate possible errors in the analytical results. The questionable quality of the data in this table should rule out its use in the 303(d) listing process.

3. Fecal Coliform

- According to fact sheet, "This pollutant is being considered for placement on the section 303(d) list under section 3.3 of the Listing Policy. Under section 3.3 [Numerical Water Quality Objectives or Standards for Bacteria Where Recreational Uses Apply] a single line of evidence is necessary to assess listing status. Three lines of evidence are available in the administrative record to assess this pollutant but only exceedances in the fecal coliform samples could be determined because a WQO has been already established in the basin plan. There are no applicable WQO or criteria with which to determine exceedances in the other two lines of evidence in fresh water."

- Three numeric lines of evidence are stated in the fact sheet.
    i. The first numeric line of evidence states that, "There is no fresh water WQO or criteria for Total Coliform applicable with protection of REC 1 BUs." This line of evidence does not provide a basis for listing fecal coliform.
    ii. The second numeric line of evidence states that, "Basin Plan WQO for single sample fecal coliform density shall not exceed 400/100ml. This WQO is linked and applicable to protection of REC-1 beneficial uses in fresh water." It is this line of evidence that provides the basis for the listing.
    iii. The third numeric line of evidence states that, "Numeric data generated from six samples out of which exceedances could not be determined because there are no applicable WQOs for enterococcus density in fresh waters (LACDWPW, 2003a)." This line of evidence does not provide a basis for listing fecal coliform.

Reasons that Fecal Coliform is an Incorrect Listing

1. The Basin Plan for the Los Angeles Region suspends the recreation beneficial use during rain events. The proposed listing for fecal coliform is based on six samples over a five month period submitted by Los Angeles County Department of Public Works (LACDPW 2003a). Of these six samples, five samples were collected during or within 24 hours of a storm event generating over ½ inch of rainfall (see Attachment 3).

   According to the 2004 Basin Plan Amendment on High Flow Suspension of Recreational Uses, water contact recreational activities and the associated bacteriological objectives set to protect those uses are suspended during days with rainfall greater than or equal to ½ inch and the 24 hours following the end of the ½ inch or greater rain event.

   Therefore, since the proposed listing is based on water contact recreation which is suspended during events at which five of the six samples were taken, this proposed listing is incorrect and should be removed from the final 2006 303(d) List.

2. The data analyzed to create the fecal coliform listing is questionable. As discussed above under the discussion for cyanide listing, the method reference for total and fecal coliforms is incorrect for the data submitted. The total coliform and fecal coliform samples were analyzed by SM9221B and SM9221E, respectively.

   The many inconsistencies in the PQLs and method references call into question the accuracy of the data submitted by LACDPW for the Burbank Western Channel.

Unfortunately, the original laboratory reports for the analyses are not available and therefore, the analytical results are unable to be verified. The number of errors in the found in the reviewable portion of the table seems to indicate possible errors in the analytical results. The questionable quality of the data in this table should rule out its use in the 303(d) listing process.

4. Nitrite

- According to fact sheet, "This pollutant is being considered for placement on the section 303(d) list under section 3.1 of the Listing Policy. Three lines of evidence are available in the administrative record to assess this pollutant. A sufficient number of samples exceed the water quality objective. In addition, a TMDL has been developed and approved by USEPA and an approved implementation plan is expected to result in attainment of the standard for Nitrite. After review of the available data and information for this recommendation, State Board staff conclude that the water body should be placed in the Water Quality Limited Segments being addressed category because a TMDL is in place and is expected to result in attainment of the standard." See below:

- Two numeric lines of evidence are stated in the fact sheet.
    - Both numeric lines of evidence indicates the beneficial use as "MU - Municipal & Domestic."
    - The first line of evidence states that, "Numeric data generated from six samples out of which one sample exceeded the WQO for protection MUN (SWRCB, 2003)."
    - The second line of evidence states that, "Numeric data generated from 27 samples taken from 3/6/02 to 5/25/04 at two to three monthly intervals. Three samples exceeded the Basin Plan Nitrite-N WQO (City of Burbank, 2004)." Combining the data from the two numeric lines of evidence result in the following statement from the weight of evidence section of the fact sheet: "Four of 33 samples exceeded the water quality standard and this exceeds the allowable frequency listed in Table 3.1 of the Listing Policy."
    - Although a third line of evidence is not stated, the State Board staff alludes to it when it states, "After review of the available data and information for this recommendation, State Board staff conclude that the water body should be placed in the Water Quality Limited Segments being addressed category because a TMDL is in place and is expected to result in attainment of the standard. The second line of evidence is that a remedial program is in place." It is under this line of evidence that State Board staff recommends the listing.

<u>Reasons that Nitrite is an Incorrect Listing</u>

1. The listed beneficial use is incorrect. The beneficial use of MU (or MUN) does not apply to the Burbank Western Channel. Region IX of the U.S. Environmental Protection Agency ("EPA") sent a letter to the State Water Resources Control Board on February 15, 2002 which states that waters identified in Table 2-1 of the 1994 Los Angeles Basin Plan with an asterisk (*) do not have municipal and domestic supply use (MUN) as a designated use until such time as the State undertakes additional study and modifies its Basin Plan. At this time, no such study or Basin Plan modification has taken place.

2. The fact sheet incorrectly analyzes nitrite according to section 3.1 of the listing policy. Section 3.1 of the listing policy (see below) describes how a segment can be listed based

on numeric water quality objectives and criteria for toxicants in water. Nitrite is not a toxicant, but is a conventional pollutant (see Table 17, page 204 of the Functional Equivalent Document for Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List). Therefore, a listing for nitrite must be based on section 3.2 of the listing policy.

> ***3.1 Numeric Water Quality Objectives and Criteria for Toxicants in Water***
> *Numeric water quality objectives for toxic pollutants, including maximum contaminant levels where applicable, or California/National Toxics Rule water quality criteria are exceeded as follows:*
>
> *• Using the binomial distribution, waters shall be placed on the section 303(d) list if the number of measured exceedances supports rejection of the null hypothesis as presented in Table 3.1.*

Section 3.2 of the listing policy (see below) is intended to be used for conventional pollutants. According to section 3.2 of the listing policy, four exceedances out of 33 samples would not qualify a segment for listing. Two additional exceedances would have been necessary for listing under this pollutant.

> ***3.2 Numeric Water Quality Objectives for Conventional or Other Pollutants in Water***
> *Numeric water quality objectives for conventional pollutants are exceeded as follows:*
>
> *• Using the binomial distribution, waters shall be placed on the section 303(d) list if the number of measured exceedances supports rejection of the null hypothesis as presented in Table 3.2.*

TABLE 3.2: MINIMUM NUMBER OF MEASURED EXCEEDANCES NEEDED TO PLACE A WATER SEGMENT ON THE SECTION 303(D) LIST FOR CONVENTIONAL OR OTHER POLLUTANTS.

Null Hypothesis: Actual exceedance proportion < 10 percent.
Alternate Hypothesis: Actual proportion > 25 percent.
The minimum effect size is 15 percent.

Sample Size	List if the number of exceedances equal or is greater than
5 – 30	5*
31 – 36	6
37 – 42	7
43 – 48	8
49 – 54	9
55 – 60	10
61 – 66	11
67 – 72	12
73 – 78	13
79 – 84	14
85 – 91	15
92 – 97	16
98 – 103	17
104 – 109	18
110 – 115	19
116 – 121	20

**Application of the binomial test requires a minimum sample size of 26. The number of exceedances required using the binomial test at a sample size of 26 is extended to smaller sample sizes.*

3. The requirement of section 2.2 of the listing policy has not been met. Section 2.2 of the listing policy states that:

> *Water segments shall be placed in this category if the conditions for placement in the water quality limited segments category (section 3) are met **and** . . . a TMDL has been developed and approved by USEPA and the approved implementation plan is expected to result in full attainment of the standard within a specified time frame.* (emphasis mine)

As made clear above, the conditions for placement in the water quality limited segments category (section 3) **have not** been met. The section 3 listing factors which could apply are:

- Numeric water quality objectives – This condition fails since only four of 33 samples exceeded water quality objectives if MUN applied. As stated above, MUN is not a beneficial use for this waterbody.
- Nuisance – The nuisance related listings, algae, odors and scum/foam, for this segment are proposed for delisting as no impairment has been demonstrated.
- Trends – A review of the trend shows nitrite levels having decreased to levels within water quality objectives without any indication of upward trends.

Therefore, the first condition of section 2.2 has not been met and this listing is contrary to the listing policy.

5. Zinc

- According to fact sheet, "This pollutant is being considered for placement on the section 303(d) list under section 3.1 of the Listing Policy. Under section 3.1 a single line of evidence is necessary to assess listing status. Two lines of evidence are available in the administrative record to assess this pollutant. One line of evidence pertains to the dissolved portion of zinc and the other pertains to the total fraction in water. Three exceedances of CTR guidelines were recorded in the dissolve zinc data set. The total zinc data set was compared to secondary MCLs and none were in exceedances. Based on the readily available data and information, the weight of evidence indicates that there is sufficient justification in favor of placing this water segment on the section 303(d) list for dissolved zinc but not for total zinc in the Water Quality Limited Segments category."

- Two numeric lines of evidence are stated in the fact sheet.
  - Both numeric line of evidence indicates the beneficial use as "MU - Municipal & Domestic, WA – Warm Freshwater Habitat."
  - The first line of evidence states that, "CTR Dissolved Zinc Criterion for continuous concentration (CCC) in water for the protection of aquatic life is expressed as a function of the total hardness of the water body." It also states that, "Numeric data generated from six samples out of which three samples exceeded the CTR criteria for protection of aquatic life (LACDPW, 2003a)."
  - The second line of evidence states that, "Secondary MCL guideline for zinc of 5 mg/l shall not be exceeded to protect MUN beneficial uses in accordance with Title 22 of the California Code of regulation table 64449-A of section 64449. " It also states that, "Numeric data generated from six samples out of which none exceeded the Secondary MCL guideline for protection of marine aquatic life (LACDPW, 2003a)."

Reasons that Zinc is an Incorrect Listing

1. The listed beneficial use "MU" is incorrect. The beneficial use of MU (or MUN) does not apply to the Burbank Western Channel. Region IX of the U.S. Environmental Protection Agency ("EPA") sent a letter to the State Water Resources Control Board on February 15, 2002 which states that waters identified in Table 2-1 of the 1994 Los Angeles Basin Plan with an asterisk (*) do not have municipal and domestic supply use (MUN) as a designated use until such time as the State undertakes additional study and modifies its Basin Plan. At this time, no such study or Basin Plan modification has taken place.

2. All readily available data and information have not been evaluated as a part of this listing. Section 6.1 of the listing policy states that, "All readily available data and information shall be evaluated."

   It is evident from the fact sheet that the data analyzed as a part of the Los Angeles River Metals TMDL was not considered in the analysis. Although the TMDL includes the analysis of 96 samples from the Burbank Western Channel (extending through December 2003), the fact sheet lists only six sample events. Of the 96 samples for the Burbank Western Channel included in the TMDL analysis, only one of these 96 samples exceeded the water quality objectives from the California Toxics Rule (see Attachment 4).

   Combing the results of these 96 samples with the six samples on the fact sheet, the result is only 4 exceedances in 102 samples. Evaluating the data from 2004 and 2005, there have been no exceedances in an additional 27 samples. This low number of exceedances precludes the listing of zinc for the Burbank Western Channel.

Thank you for your consideration of our concerns. If you have any questions, please call me at (818) 238-3931.

Sincerely,

Rodney Andersen
Principal Civil Engineer

Attachments:

1. Final Results of Phase 1 Study on Algae Related Impairments in the Burbank Western Channel
2. Ammonia in the Burbank Western Channel
3. Bob Hope Airport Precipitation Data
4. Hardness and Zinc Data in the Burbank Western Channel
5. Standard Operating Procedure for Receiving Water Monitoring in the Burbank Western Channel

Attachment 1

LARRY WALKER ASSOCIATES

Memorandum

DATE: December 15, 2005

TO: Sam Unger, Los Angeles Regional Water Quality Control Board

SUBJECT: Final Results of Phase 1 Study on Algae Related Impairments in the Burbank Western Channel

Cc: Rodney Andersen, City of Burbank
Clayton Yoshida, City of Los Angeles

Sharon Landau, Project Engineer

429 Santa Monica Blvd., Suite 270
Santa Monica, CA 90401
310.394.1036
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sharonl@lwa.com

This memo summarizes the completed Phase 1 Study on impairments related to algae in the Burbank Western Channel. The Phase 1 study is part of a workplan dated 3/31/05 (see Attachment 1) which was approved on 4/18/05 by the Regional Board staff as part of the implementation requirements for the Los Angeles River Nitrogen TMDL. Presented below are the purpose of the study, the results, and the implications of the study for the Nitrogen TMDL and its associated 303(d) listings.

Background

The purpose of this study was to determine if reductions in nitrogen loadings due to operation of full scale nitrification/denitrification (NDN) facilities have eradicated or ameliorated listed impairments related to algae. This hypothesis was tested in the Burbank Western Channel where the Burbank Water Reclamation Plant's NDN facilities have been in operation since 2003. The effluent from this treatment plant comprises the majority of the flow in the Burbank Western Channel except during storm runoff periods. The listed impairments include algae, pH, foam/scum, and odors.

To determine if NDN has been successful in addressing the algae-related listings, seven field sampling events were conducted in the Burbank Western Channel to characterize these potential problems. The sampling events took place on the following dates:

04/20/05
06/01/05
06/29/05
07/20/05
08/24/05
10/04/05
10/31/05

The goal was to conduct one event per month during the dry season when algal growth and its related effects are expected to be highest due to low flows and abundant sunlight. Because there was unexpected rainfall in May and September, two events were postponed until the following month to allow algae to recolonize the Burbank Western Channel after scouring due to high flows. Accordingly, there were two events in June and October. It is important to note that the last event on October 31st took place one week after a rain event. The decision to proceed with the event before 14 days called for in the study protocol was based on the possibility of frequent rain events with little recovery time during the wet season, which begins in November.

Greg Reide of LWA, Julie Simpson of UCSB, and Rodney Andersen of the City of Burbank were present at all seven sampling events. Clayton Yoshida of the City of Los Angeles and Elizabeth Erickson of the Regional Board were present at some events. Ms. Simpson's qualifications as an algae biologist are detailed in the Work Plan.

Attachment **2** provides the Phase 1 field protocol guidance. First the presence of foul odors was ascertained. Then percent cover and color of algae was recorded, and lastly field measurements such as flow, dissolved oxygen, light intensity, and pH were taken. Visual observations such as the presence of wildlife, type of substrate, and weather were also recorded. The results for all parameters measured are provided in the four spreadsheets in Attachment **3**.

Table 1 below includes the main parameters that were measured and the thresholds for determining if algae related impairments exist in the channel.

Table 1. Thresholds for Identifying Potential Impairments during Phase 1[1] (from 3/31/05 Workplan)

Parameter	Threshold Indicating Potential Impairment	Frequency Indicating Potential Impairment[2]	Rationale
Dissolved Oxygen	Below 5 mg/L[3] in the early morning AND EITHER: >60% benthic algal cover[4] of the following combined: * biofilm > 3 mm * filamentous algae > 10 cm OR >30% cover of floating algae	1	5 mg/L is the Basin Plan objective for DO, and DO levels are usually at their lowest in early morning. The algae threshold is based upon Julie Simpson's work in the Malibu Creek Watershed. High DO fluctuations started to arise when algal cover reached these levels. According to Ms. Simpson, a benthic algal biofilm > than 3 mm thick and benthic filamentous algae > than 10 cm can be a response to nutrient enrichment. Finding a DO problem once indicates a recurring problem.
pH	Above 8.5[5] during daytime AND EITHER: > 60% benthic algal cover[6] of the following combined: *biofilm > 3 mm * filamentous algae > 10 cm OR >30% cover of floating algae	2	The Basin Plan states that pH above 8.5 is not allowed. The algae threshold is based upon a master's thesis (Stuart 2002). At these levels, algae could be responsible for high pH when it photosynthesizes. According to Julie Simpson, finding a pH problem once could be due to something other than algae, but finding a problem twice is a concern.
Scum/ Foam	> 15% cover AND Associated with floating algae	2	>15% cover was based on the Julie Simpson's experience in the field. Finding scum or foam on two occasions indicates a potential problem.
Odors	Maximum acceptable odor strength exceeded AND Rotten egg smell AND Visible decaying algae	2	Large amounts of algal decay are often associated with a strong rotten egg smell. Decaying algae will be visible on the substrate. Finding decaying algae on two occasions indicates a potential problem.
Algae	>30% cover of floating algae	2	This threshold is based upon the algae target in the Malibu Creek TMDL for recreational use protection.

[1] These thresholds are only intended for use for this workplan to trigger work to be accomplished in Phase 2. They are not adopted standards or criteria and should not be interpreted as such without a public review process and completion of the standard adoption process.

[2] Measurements will be taken seven times during Phase 1.

[3] The threshold for determining whether DO levels are too low will be the Basin Plan objective of 5 mg/l of dissolved oxygen.

[4] This threshold of % algal cover was determined using DO and algae data collected in the Malibu Creek Watershed by Julie Simpson of UCSB.

[5] According to the Basin Plan, a pH above 8.5 is considered problematic.

[6] This threshold of % algal cover was determined by using information from a thesis study conducted on the White River in Washington and Julie Simpson's best professional judgment. The reference for the thesis study is: Stuart, DL. A study of periphyton induced pH spikes on the White River, Washington. University of Washington. 2002.

Results

No impairments related to algae as measured using the thresholds in Table 1 were observed during any of the seven field events. Table 2 shows the results for all of the thresholds.

Table 2. Summary Results for Phase 1

Parameter	Result
Benthic Algae Biofilm > 3mm	Never observed
Benthic Filamentous Algae > 10 cm	Observed during 3 events. % cover ranged from 2.9% to 5.2 % when observed.
Floating Algae	Never observed
Dissolved Oxygen	Ranged from 6.94 to 12.83 mg/L
pH	Ranged from 6.85 to 8.43
Foam/Scum	Never observed
Odors	Faint musty odors unrelated to algal decay were detected during two events.
Chlorine	< .1 mg/L

The results shown above are described below in more detail.

Algae

Algae were measured for aquatic life and recreational use impacts. As shown in Table 1, the recreational use threshold for algae is >30% cover of floating algae and the aquatic life use threshold is >60% algal cover of benthic algae in combination with low DO or high pH levels. Benthic biofilm algae was never observed over the threshold value of 3 mm, and floating algae was never observed. Benthic filamentous algae of 10 cm or greater was observed during 3 events in late June, July, and August, but the percent cover never exceeded 5.2%. Therefore, the algae thresholds were never exceeded.

Dissolved Oxygen

Dissolved oxygen levels were never below the threshold of 5 mg/L when measured at midday. Table 3 below shows additional dissolved oxygen data collected weekly by the City of Burbank between 9 am and 11 am at the sampling site.

Table 3. Dissolved Oxygen Measurements Taken by the City of Burbank at Phase 1 Sampling Location

Month	Minimum (mg/L)	Maximum (mg/L)
April	6.3	7.3
May	5.8	7.7
June	7	8
July	8	8.6
August	6.8	9.6
September	7.7	9.4
October	7.1	9.5

The data from both the Phase 1 study and the City of Burbank support the conclusion that depressed oxygen levels are not a problem in the Burbank Western Channel.

pH

pH ranged from 6.85 to 8.43 when measured at midday. Table 3 below shows additional pH data collected weekly by the City of Burbank at the sampling site between 9 am and 11 am.

Table 4. pH Measurements Taken by the City of Burbank at Phase 1 Sampling Location

Month	Minimum (mg/L)	Maximum (mg/L)
April	7	7.2
May	6.7	7.3
June	6.7	7.4
July	7.1	7.5
August	7	7.5
September	7.2	7.5
October	7.2	7.6

While pH in the Phase 1 study approached the threshold of 8.5 (see Attachment **3**), the algae component of the threshold never approached 60% cover of benthic or 30% cover of floating algae. Because of this, elevated pH due to algal photosynthesis is considered improbable. In addition, the pH data provided by the City of Burbank never exceed 8 and support the conclusion that elevated pH due to algae is unlikely in the Burbank Western Channel.

Foam and Scum

Foam/scum was never observed.

Odors

Faint musty odors were detected during the early June and July events. The threshold indicating potential impairment calls for odors that smell like rotten eggs, which are characteristic of decaying algae. Because this type of odor was never observed, the odor threshold was not exceeded.

Chlorine

Although chlorine was not a part of the thresholds, there was concern that chlorine levels might inhibit algal growth. This is unlikely as chlorine levels never exceeded the detection limit of 0.1 mg/L at the sampling location.

Implications of Phase 1 Study Results

According to the workplan, if problems related to algae were identified during Phase 1, more in-depth investigation would be conducted during Phase 2. Phase 2 investigations would involve more data collection and analysis. Because no algae-related impairments were identified during Phase 1, Phase 2 is not necessary and will not be conducted.

The State Board has proposed delistings for algae in some reaches of the Los Angeles River Watershed because algae is not a pollutant and it is uncertain if there are pollutants exceeding water quality standards that are causing excess algal growth. The Phase 1 study results provide support for these delistings for areas where NDN is implemented.

Next Steps

The Cities of Burbank and Los Angeles have completed their investigation of algae related impairments in the Los Angeles River Watershed. They will consider their obligation under the TMDL to be fulfilled unless they are informed otherwise by Regional Board staff.

Attachment 1

March 2005

Workplan for the Evaluation of the Effectiveness of Nitrogen Loading Reductions in Removing Algae-Related Impairments in the Los Angeles River Watershed

As Required in the Nitrogen Compounds and Related Effects TMDL

Submitted to:
Los Angeles Regional Water Quality Control Board
Submitted by:
City of Los Angeles Watershed Protection Division
City of Burbank Public Works Department

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INTRODUCTION

The Los Angeles Regional Water Quality Control Board adopted the *TMDL for Nitrogen Compounds and Related Effects in the Los Angeles River (TMDL)* on July 10, 2003. The TMDL was then promulgated by the US Environmental Protection Agency and became effective on March 23, 2004.

As part of the TMDL's implementation, this workplan must be submitted to the Los Angeles Regional Water Quality Control Board (Regional Board) by March 23, 2005. The workplan will evaluate the effectiveness of nitrogen reductions due to advanced wastewater treatment in removing impairments from algae, odors, scum/foam, and pH. The evaluation will be conducted in two phases. The first phase will determine if the impairments remain. The second phase will involve an in-depth analysis of the effectiveness of nitrogen reductions in removing impairments wherever they are found.

This document outlines the tasks to be conducted under both phases of the workplan and the procedures and methods for completing the tasks. Costs for completing the workplan tasks will be shared by the Cities of Los Angeles and Burbank. Based on the information obtained through implementing the workplan, the Regional Board may revise and/ or establish new wasteload allocations.

The groundwater study required as part of the TMDL's implementation will be developed separately from this workplan.

BACKGROUND

The listings in this TMDL that must be addressed by the workplan include algae, scum/foam, odors, and pH. Table 1 shows the listings for each reach in the Los Angeles River and its Tributaries (Watershed).

Table 1. 303(d) Listings Included in the TMDL

Reach Name	Listed Parameter(s)					
	Ammonia	Nutrients	Algae	Odors	Scum/ Foam	pH
Los Angeles River at Sepulveda Basin	X	X		X	X	
Los Angeles River from Sepulveda Dam to Riverside Dr.	X	X		X	X	
Los Angeles River from Riverside Dr. To Figueroa St.	X	X		X	X	
Tujunga Wash	X			X	X	
Burbank Western Channel	X		X	X	X	
Verdugo Wash			X			
Arroyo Seco			X			
Los Angeles River from Figueroa St. to Carson St.	X	X		X	X	
Rio Hondo from the Santa Ana Fwy to Los Angeles River						X
Compton Creek						X
Los Angeles River from Carson St. to Estuary	X	X			X	X

The major source of nitrogen in the watershed during the dry-weather critical period is Publicly Owned Treatment Works (POTWs), according to a study conducted by the Southern California Coastal Water Research Project (SCCWRP) in 2000[1]. Table 2 below shows the results of this study. Nonpoint source runoff is minimal during the critical period and is not shown in Table 2.

Table 2. Nitrogen Loadings to the Los Angeles River Watershed

Constituent	Loading (kg/day)		
	Major POTWs[2]	Tributaries	Storm Drains
Ammonia	2853.45	469.98	0.00
Nitrate	115.52	126.35	122.74
Organic N	3334.12	691.22	81.32
Total Load	6303.09	1287.55	204.06
% of Total Load	80.86	16.52	2.62

The major POTWs referred to in Table 2 include the following water reclamation plants (WRPs): Donald C. Tillman WRP, Los Angeles-Glendale WRP, and Burbank WRP. The Tapia Water Reclamation Facility,

[1] Ackerman D, Schiff K, Trim H, and Mullin M. 2000. Characterization of water quality in the Los Angeles River. Southern California Coastal Water Research Project. Westminster, CA.

[2] Nitrification and denitrification treatment processes will significantly reduce nitrogen loadings once they are employed by the major POTWs.

Whittier Narrows WRP, and a WRP located in the Los Angeles Zoo are considered minor point sources and were not considered in the source assessment for the TMDL. While tributaries and storm drains contribute less than 20% of the total nitrogen loadings, they are a significant source of nitrate.

Although the cause of the algae, scum/foam, odor, and pH impairments is unknown, it is hypothesized that nitrogen loadings are responsible for the proliferation of algae and related adverse effects. Because of this, it is possible that many of the impairments in the Watershed may disappear once the major POTWs mentioned above fully employ nitrification and denitrification (NDN) treatment processes required by the TMDL. The TMDL states that "attaining the nitrogen compound objectives [through NDN treatment] will likely address ancillary nutrient effects, including dissolved oxygen and algal growth. The implementation plan requires continued studies to verify this assumption" (RWQCB, 2003, p.3). Thus, the goal of this workplan is to determine how effective the operation of NDN facilities will be in removing the impairments. The work conducted under the workplan will only focus downstream of the Burbank WRP because it will be the only major POTW with fully operational NDN facilities by the time the workplan study is conducted. Their NDN facilities have been in operation since April of 2003. The other two major POTWs, both operated by the City of Los Angeles, are not scheduled to have their NDN facilities fully operational until late 2007.

Table 3 below shows the deadlines for completing the work included in the workplan and the schedule for completing the work. The tasks shown in Table 3 for Phase 1 and 2 are described in detail later in this document.

Table 3. Schedule for Completing Phases 1 and 2 of the Workplan

Task	Date/ Deadline
Submittal of Workplan to Regional Board	March 23, 2005
Development of Phase 1 Monitoring Protocol	April 2005
Phase 1 Data Collection	April to October 2005
Phase 1 Data Analysis	November to December 2005
Development of Phase 2 Sampling and Analysis Plan	March 2006 or 2007
Phase 2 Data Collection	April to October 2006 or 2007
Phase 2 Data Analysis	November to December 2006 or 2007
Tillman and LA/ Glendale WRPs have fully operational NDN	October to December 2007
Completed Evaluation of Data and the Need for Revised or New WLAs	March 23, 2008

PHASE 1

As stated previously, the presence of impairments specified in the TMDL will be investigated during Phase 1. This phase will not entail laboratory analysis or in-depth analyses but will act as a screen for potential problems and impairments by using indicators and thresholds developed specifically for this workplan. To determine whether impairments caused by nitrogen loadings remain, the first phase of the workplan will involve the recording of field observations and measurements of dissolved oxygen and pH at sites upstream and downstream of the Burbank WRP. The visual field observations will include:

- estimates of the levels of algae, scum, and foam
- estimates of the strength and type of any odors
- an assessment of beneficial uses

A field sheet has been developed for recording the field observations and measurements of DO and pH. It is included in Appendix B.

Because the Burbank WRP will have been employing NDN for approximately two years when the Phase 1 investigation is conducted during summer 2005, a monitoring site will be located in the Burbank Western Channel. The other two major POTWs, both operated by the City of Los Angeles, are not scheduled to have their NDN facilities fully operational until late 2007.

Indicators for Detecting Potential Impairments

This workplan focuses on potential adverse effects caused by algae as described in the TMDL. These adverse effects include increased pH, foam, scum, and odors. The TMDL states that "one mechanism by which excess algal biomass can adversely impact beneficial uses is through eutrophication that results in low dissolved oxygen (DO) concentrations" and that "another mechanism of impairment [of recreational beneficial uses] occurs when excess algal biomass results in unpleasant odors and scum" (RWQCB, 2003, p.38). The TMDL also states that "excessive growth [due to algae] can cause water quality problems (e.g. pH altered beyond the acceptable range)..." (RWQCB, 2003, p.24). Consequently, DO and pH will be used as indicators of aquatic life use impairment due to algae, and foam/scum and odors will be used as indicators of recreational use impairment due to algae. Floating algae will be used as an indicator of impairment for aesthetic recreational uses.

DO will be used as an indicator of aquatic life use impairment because algae can create hypoxic conditions through consuming oxygen when it decays and at night when it metabolizes. Floating algal mats can also prevent oxygen exchange with the atmosphere causing hypoxic conditions to occur beneath them. Because hypoxia can stress aquatic life and even cause mortality, the role of algae in lowering dissolved oxygen is of primary importance and is a focus of this workplan.

pH will be used as an indicator of aquatic life use impairment because it significantly affects the toxicity of ammonia. It is considered to be a response variable for algae because elevated levels of algal biomass can increase pH during photosynthesis.

Odors due to decaying algae will be used as an indicator of recreational use impairment because they can impact aesthetics and passive recreation such as jogging, walking, bird watching, hiking, and bicycling along the edges of the reaches. In addition, scum and foam associated with floating algae will also be used as indicators of recreational use impairment. This is consistent with the TMDL, which states the following:

> "The specific quantity of algal biomass that produces scum and odors varies with many factors.... It is anticipated that reductions in nitrogen compounds implemented as part of this TMDL will reduce algal biomass. If those measures serve to ameliorate problems with scums and odors, then the impairment will be considered to be removed" (RWQCB, 2003, p.39).

Because the determination that an odor is offensive is very subjective, Regional Board staff will be invited to every monitoring event during Phase 1. The field crew and Regional Board staff will decide as a group the minimum odor strength that is considered offensive. If Regional Board staff are unable to attend a field event, the field crew will still proceed.

Thresholds Indicating Potential Impairments

A threshold of impairment was developed for each indicator discussed in the previous section. Because there is no scientific consensus on acceptable levels of algae, foam/scum, and odors and the connection between algal levels and DO and pH can vary widely based on site-specific factors, the thresholds were determined with the help of Julie Simpson from the University of California at Santa Barbara (UCSB). Ms. Simpson has extensive experience in algal sampling and data analysis and has been involved in algae studies in the Malibu Creek Watershed and Ventura River Watershed. With this experience, she was able to provide expert advice on the development of appropriate thresholds for the Los Angeles River Watershed[3].

The thresholds are shown in Table 4. If specific references were considered, they are shown in the footnotes. Otherwise, Ms. Simpson's best professional judgment was relied upon to determine the thresholds. Relying on her professional judgment is sufficient for Phase 1 because the thresholds are protective of beneficial uses and will trigger further analysis in Phase 2 if they are exceeded.

Each of the thresholds acts as an indicator for potential algae problems. No threshold was developed for "nutrients" because the TMDL considers algae problems to be indicative of nutrient problems. The TMDL states that "nitrate, nitrite, and total nitrogen are considered nutrients that are known to promote plant and algae growth" (RWQCB, 2003, p.22). Thus, if no problems associated with algae are found, nutrients will not be considered to be a problem as well. If any problems associated with algae are found during Phase 1, determination of the limiting nutrient will be investigated and potential "nutrient" impairment will be evaluated in Phase 2.

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[3] Julie Simpson's work related to algae includes the following:

Busse, L.B., Simpson, J.C., Cooper, S.D., Kamer K, and Stein E., 2003. A survey of algae and nutrients in the Malibu Creek watershed. Technical Report 412 of the Southern California Coastal Water Research Project, Westminster, CA.

Leydecker, A., Simpson, J. and Grabowski, L.A. Nutrient Uptake and Cycles of Change: the Ventura River in Southern California. Presented at the 2003 American Geophysical Union conference and the 2004 American Chemical Society conference.

Simpson, J.C., Busse, L.B., and Cooper, S.D. Urban sprawl promotes nuisance algal blooms in the Los Angeles area. Presented at the Symposium on Urbanization and Stream Ecology, Melbourne, Australia, 2003.

Simpson, J.C., and Leydecker, A. Anthropogenic influences on biological uptake and transformations of nitrogen and phosphorus in southern California coastal streams. Presented at the 2003 LTER-All Scientists Meeting, Seattle, WA.

Table 4. Thresholds for Identifying Potential Impairments during Phase 1[4]

Parameter	Threshold Indicating Potential Impairment	Frequency Indicating Potential Impairment[5]	Rationale
Dissolved Oxygen	Below 5 mg/L[6] in the early morning AND EITHER: >60% benthic algal cover[7] of the following combined: * biofilm > 3 mm * filamentous algae > 10 cm OR >30% cover of floating algae	1	5 mg/L is the Basin Plan objective for DO, and DO levels are usually at their lowest in early morning. The algae threshold is based upon Julie Simpson's work in the Malibu Creek Watershed. High DO fluctuations started to arise when algal cover reached these levels. According to Ms. Simpson, a benthic algal biofilm > than 3 mm thick and benthic filamentous algae > than 10 cm can be a response to nutrient enrichment. Finding a DO problem once indicates a recurring problem.
pH	Above 8.5[8] during daytime AND EITHER: > 60% benthic algal cover[9] of the following combined: *biofilm > 3 mm * filamentous algae > 10 cm OR >30% cover of floating algae	2	The Basin Plan states that pH above 8.5 is not allowed. The algae threshold is based upon a master's thesis. At these levels, algae could be responsible for high pH when it photosynthesizes. According to Julie Simpson, finding a pH problem once could be due to something other than algae, but finding a problem twice is a concern.
Scum/ Foam	> 15% cover AND Associated with floating algae	2	>15% cover was based on the Julie Simpson's experience in the field. Finding scum or foam on two occasions indicates a potential problem.
Odors	Maximum acceptable odor strength exceeded AND Rotten egg smell AND Visible decaying algae	2	Large amounts of algal decay are often associated with a strong rotten egg smell. Decaying algae will be visible on the substrate. Finding decaying algae on two occasions indicates a potential problem.
Algae	>30% cover of floating algae	2	This threshold is based upon the algae target in the Malibu Creek TMDL for recreational use protection.

[4] These thresholds are only intended for use for this workplan to trigger work to be accomplished in Phase 2. They are not adopted standards or criteria and should not be interpreted as such without a public review process and completion of the standard adoption process.

[5] Measurements will be taken seven times during Phase 1.

[6] The threshold for determining whether DO levels are too low will be the Basin Plan objective of 5 mg/l of dissolved oxygen.

[7] This threshold of % algal cover was determined using DO and algae data collected in the Malibu Creek Watershed by Julie Simpson of UCSB.

[8] According to the Basin Plan, a pH above 8.5 is considered problematic.

[9] This threshold of % algal cover was determined by using information from a thesis study conducted on the White River in Washington and Julie Simpson's best professional judgment. The reference for the thesis study is:

Stuart, DL. A study of periphyton induced pH spikes on the White River, Washington. University of Washington. 2002.

Only those parameters for which the above thresholds and frequencies are exceeded will be investigated further in Phase 2. If no thresholds are exceeded, Phase 2 will not be necessary and it will be assumed that any listings related to algae in the Watershed will be eradicated on all reaches where NDN is in full operation.

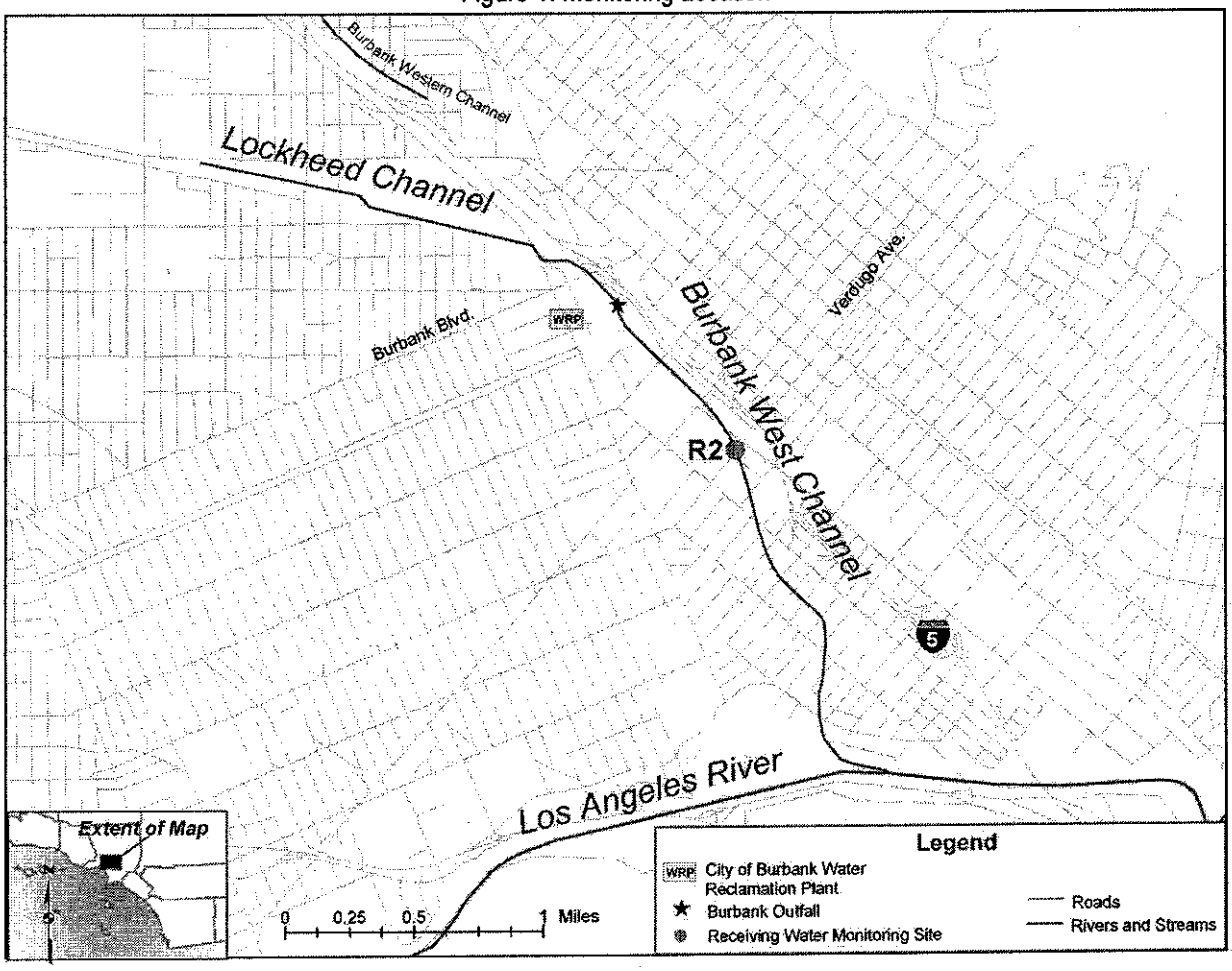
Data Collection

The sections below describe the various components of the Phase 1 data collection effort.

Monitoring Location

The map in Figure 1 shows the monitoring location within the Burbank Western Channel.

Figure 1. Monitoring Location



One site located approximately 3900 feet downstream of the Burbank WRP was selected for this workplan. This site corresponds to the Burbank WRP receiving water sampling location R2. Selecting a site already in use for other monitoring efforts ensures that it will be easily accessible and maximizes opportunities for cost

sharing. Where the City of Burbank is already measuring parameters included in this workplan, their data will be shared in lieu of duplicating their efforts.

To ensure that residual chlorine levels are below detection at this site, residual chlorine will be measured at this site whenever field observations are recorded. If residual chlorine levels are found to be elevated, the site will be relocated for future field events.

Monitoring Frequency

Field observations will be recorded and measurements taken once per month during the 2005 algae growing season, April through October, which is the critical period for this TMDL.

Data Management

All collected data will be entered into a database, which will be accessible to all stakeholders and the Regional Board. This database will be used to determine which thresholds have been exceeded and require further investigation in Phase 2.

Monitoring Protocol

A monitoring protocol will be written for Phase 1 to ensure that procedures are consistent on each site visit.

Data Analysis

Data analysis for Phase 1 will involve comparison of collected data with the thresholds. Any exceedances of thresholds will indicate the need for Phase 2 data collection and analysis. Phase 1 analysis will identify the monitoring and analysis needed in Phase 2 and items to be included in the Phase 2 sampling and analysis plan described later in this document.

Application of Phase 1 Findings to the Entire Watershed

If no thresholds are exceeded during Phase 1, it will be concluded that NDN can be effective in removing impairments related to algae throughout the Watershed. If thresholds are exceeded in Phase 1, it will be concluded that NDN alone is probably insufficient for removing impairments related to algae throughout the Watershed. It is possible to extrapolate from the Burbank Western Channel to the entire Watershed because it is a good representative site in terms of potential for algae-related impairments. Conditions are more conducive to algal growth in the Burbank Western Channel because its flow is slower and shallower than in most of the reaches downstream of the Tillman and Los Angeles/ Glendale WRPs and there is little to no riparian cover. Its concrete substrate is also representative of most of the Watershed which is highly channelized.

PHASE 2

Phase 2 will be much more in-depth than Phase 1. The goal of Phase 2 is to determine if nitrogen loadings are causing any of the potential impairments and if reducing loadings beyond those achieved by NDN is necessary. If any of the thresholds and frequencies for any of the parameters are exceeded in Phase 1 and the impairments are correlated with algae, the amount of algae and the factors responsible for the observed algae levels will have to be identified. The following sections describe the information to be collected as part of a Phase 2 monitoring program and nutrient limitation study and how the collected information will be analyzed.

Data Collection

The parameters to be monitored as part of Phase 2 will vary depending on what impairments and problems are found during Phase 1. A comprehensive list of parameters to be measured is included in Table 5, although it is possible that measuring all of them during Phase 2 will be unnecessary.

Sampling Frequency

All monitoring will take place during the 2006 or 2007 algae growing season, April through October, which is the critical period for this TMDL. The nitrogen and phosphorus species, algae % cover and thickness, foam, scum, and odors will be measured on a monthly basis during the algae growing season. Chlorophyll a (chl a), ash-free dry weight, carbon content, nitrogen content, and phosphorus content of algae will be measured a total of three times during the algae growing season, approximately in May, July, and September. Whenever algae samples are collected on a reach suspected to have an aquatic life use impairment, 24-hour dissolved oxygen and/ or pH measurements will be taken to allow investigation of the effect of algae levels on dissolved oxygen levels and/ or pH. Table 5 shows the sampling frequency for each parameter.

Table 5. Sampling Frequency for Individual Parameters

Parameter	Frequency	Phase 1 Threshold Exceedance Triggering Phase 2 Measurement
Nitrate	7	Any Threshold Exceedance during Phase 1
Nitrite	7	
TKN	7	
Ammonia	7	
Total Nitrogen	7	
Total Phosphorus	7	
Orthophosphate	7	
Substrate type	7	
Light availability	7	
Riparian cover	7	
Temperature	7	
Conductivity	7	
Flow rate	7	
Algae % cover and thickness	7	
Algae chl a	3	
Algae ash free dry weight	3	
Algae Nitrogen Content	3	
Algae Phosphorus Content	3	
Dissolved Oxygen	7	DO
pH	7	pH
24-hour DO and pH	3	DO and/or pH
Odors	7	Odors
Foam/Scum % cover	7	Foam/Scum
Foam/ Scum Content	As needed	Foam/Scum

Methods for Sampling and Analysis

Nitrogen and phosphorus will be collected as grab samples and will require laboratory analysis. Algae samples will be collected according to a protocol described in a separate sampling plan to be developed in Phase 2. The protocol will involve the collection of algae samples along several transects and the compositing of multiple algae samples along each transect. The number of transects and number of samples along each transect will be included in the protocol.

Algae samples will also require laboratory analysis for chlorophyll a (chl a), ash-free dry weight, carbon content, nitrogen content, and phosphorus content. Chl a measurements provide the mass of chl a present per square meter of streambed and an estimate of how much algae is present in a given section of a stream. Ash free dry weight provides the total mass of organic matter present per square meter of streambed. Organic matter can consist of algae, detritus, and heterotrophic organisms. If there is a major discrepancy between the chl a and ash free dry weight data, the components of the organic matter in the stream can be investigated and the methods for measuring chl a can be checked for errors. Carbon, nitrogen, and phosphorus content will be used in determining the limiting nutrient.

Whenever scum or foam is detected, a sample will be collected for laboratory analysis to ascertain its components and determine whether it is caused by algae or some other factor.

Substrate type, light availability, and riparian cover will be measured to help determine the cause of algal impairments where they occur. Collecting this information will require minimal effort and expense since people will already be out in the field collecting the algae samples. Substrate type will be recorded as concrete, sand, cobbles, etc. Light availability will be measured using a light meter. Riparian cover will be measured using a spherical densiometer.

Table 6 shows the methods that will be employed to measure all parameters. Nitrogen and phosphorus samples will be sent to a lab near or within the Watershed. A certified laboratory for algae analysis will be retained and may not be located near the Watershed.

Table 6. Methods for Measuring and Analyzing Each Parameter

Parameter	Method of Measurement
Nitrite	SM 4500
Nitrate	SM 4500
TKN	SM 4500
Ammonia	SM 4500
Total Nitrogen	SM 4500
Total Phosphorus	SM 4500
Orthophosphate	SM 4500
Dissolved Oxygen	Field Measurement – Portable instrumentation
Temperature	Field Measurement – Portable instrumentation
pH	Field Measurement – Portable instrumentation
Conductivity	Field Measurement – Portable instrumentation
Flow rate	Field Measurement – Portable instrumentation
24-hour dissolved oxygen and pH	Field Measurement – Portable instrumentation left in field overnight
Algae chl a	Depends on laboratory
Algae ash free dry weight	2 hours of heating in a muffle furnace at 550C
Algae Carbon Content	Depends on laboratory
Algae Nitrogen Content	Depends on laboratory
Algae Phosphorus Content	Depends on laboratory
Algae % cover and thickness	Field Measurement – Grids and Transects
Odors	Field Measurement – Observation
Foam/ Scum % cover	Field Measurement – Observation
Foam/ Scum content	Laboratory analysis
Substrate type	Field Measurement – Observation
Light availability	Field Measurement – Light meter
Riparian cover	Field Measurement – Spherical densiometer

Nutrient Limitation Study

The workplan requires that a schedule and protocol for determining the limiting nutrient be included in the workplan. This information will help determine whether reducing nitrogen or phosphorus levels will be more effective in controlling algae. The nutrient limitation study will be conducted for any potential impairments related to algae. The scheduling of the nutrient limitation study will coincide with Phase 2 data collection and analysis.

With regard to the protocol, nutrient limitation will be investigated by obtaining carbon, nitrogen, and phosphorus levels in collected algae samples. Algae growing under optimal nutrient conditions usually maintain balanced internal C:N:P ratios, with a typical ratio of 158:18:1 in freshwater algae (Kahlert 1998)[10]. Nutrient limitation of algal growth will be evaluated by analyzing the ratios in algae from the Burbank Western Channel and searching for any imbalances in these ratios. Nutrient limitation will also be estimated by examining N:P ratios in the water column. Because the degree and the type of nutrient limitation can change over time, these measurements will be taken three times during the monitoring period. The Sampling and Analysis Plan discussed below will contain specific directions for conducting the nutrient limitation study.

Timing and Duration of Monitoring and Nutrient Study

In order to ensure that the tasks outlined in the workplan are completed by March 23, 2008 deadline, the monitoring and nutrient study should be completed no later than October 2007. Therefore, Phase 2 monitoring and sample collection in the channel should start by April 2007, if not sooner.

Data Management

All collected data will be entered into a database, which will be accessible to all stakeholders and the Regional Board. This database will be used to investigate possible correlations between some of the parameters.

Data Analysis

Once the data collection is complete, it will be analyzed to determine if any of the potential impairments can be removed through further reductions in nitrogen loadings. The following sections briefly describe the approaches to the various analyses. Only analyses found to be necessary during Phase 1 will be conducted during Phase 2.

[10] Kahlert, Maria. C:N:P ratios of freshwater benthic algae. Arch. Hydrobiol. Spec. Issues Advanc. Limnol. 51: 105-114. 1998.

Dissolved Oxygen and pH

For protection of aquatic life, associations between algae and dissolved oxygen and/ or pH data will be investigated. If the analysis indicates a significant relationship, further analysis will investigate whether reducing nitrogen loadings will decrease algal growth. This analysis will include consideration of the limiting nutrient and whether physical characteristics such as light and substrate are significant factors.

Scum and Foam

Floating algae can potentially cause a scum/foam on the water surface. If it is found in Phase 1 that scum/foam due to algae is problematic, scum/foam samples will be collected during Phase 2 for laboratory analysis to determine their components. If the laboratory results verify that the scum/foam problem is related to algae, Phase 2 analysis will investigate whether reducing nitrogen loadings will decrease algal growth and thereby remove the scum/foam problem. This analysis will include consideration of the limiting nutrient and whether physical characteristics such as light and substrate are significant factors.

Odors

Odors due to algae can arise when algae decays. If it is found in Phase 1 that odors due to algae are problematic, Phase 2 analysis will investigate whether reducing nitrogen loadings will decrease algal growth and thereby remove the odor problem.

Options for Reducing Nitrogen Loadings

If it is found that reducing nitrogen loadings is necessary, a list of options for reducing these loadings will be presented. An analysis of the feasibility of implementing these options, however, is beyond the scope of this workplan.

Data Analysis Summary

Table 7 provides a summary of the questions that will be addressed as part of the data analysis.

Table 7. **Phase 2 Data Analyses Questions**

Phase 1 Threshold Exceedance	Question	303 (d) Listing Addressed
Low DO	Are algae responsible for observed low DO levels?	Algae
High pH	Are algae responsible for observed high pH levels?	pH, Algae
Any threshold: Low DO, High pH, High Foam/Scum, Strong Odors, High Floating Algae	What factor is limiting algae growth, and will reducing nitrogen levels remove impairment(s)?	Any listing: Algae, pH, Odors, Foam/Scum
Any threshold: Low DO, High pH, High Foam/Scum, Strong Odors, High Floating Algae	If nitrogen loading reductions are necessary, what options are there for doing so?	Any listing: Algae, pH, Odors, Foam/Scum

Sampling and Analysis Plan

A sampling and analysis plan will be written if Phase 2 is found to be necessary during Phase 1. This plan will describe the sampling procedures, holding times, laboratories where samples will be sent, and quality control/quality assurance procedures. Special attention will be paid to procedures for collecting algae and identifying the nutrient limiting algae growth. This plan will include a more detailed approach for analyzing and investigating whatever problems are identified during Phase 1.

Application of Phase 2 Findings to the Entire Watershed

Phase 2 findings cannot be directly applied to any waterbody other than the Burbank Western Channel, although the findings could provide useful information on algae and its related effects throughout the Watershed. If Phase 2 is necessary, further data collection and evaluation downstream of the Tillman and the Los Angeles/ Glendale WRPs can be conducted after these plants have fully operational NDN facilities. Because at least two years of data reflecting the reductions in the nitrogen loadings will be available in 2010, the 2010 303(d) listing process will provide a prime opportunity for determining 1) if NDN has helped to remove algae related impairments downstream of these two WRPs and 2) if additional data on any remaining algae related impairments should be collected and analyzed. Collecting and analyzing additional data in response to any algae related impairments found during the 2008 303(d) listing process would be premature.

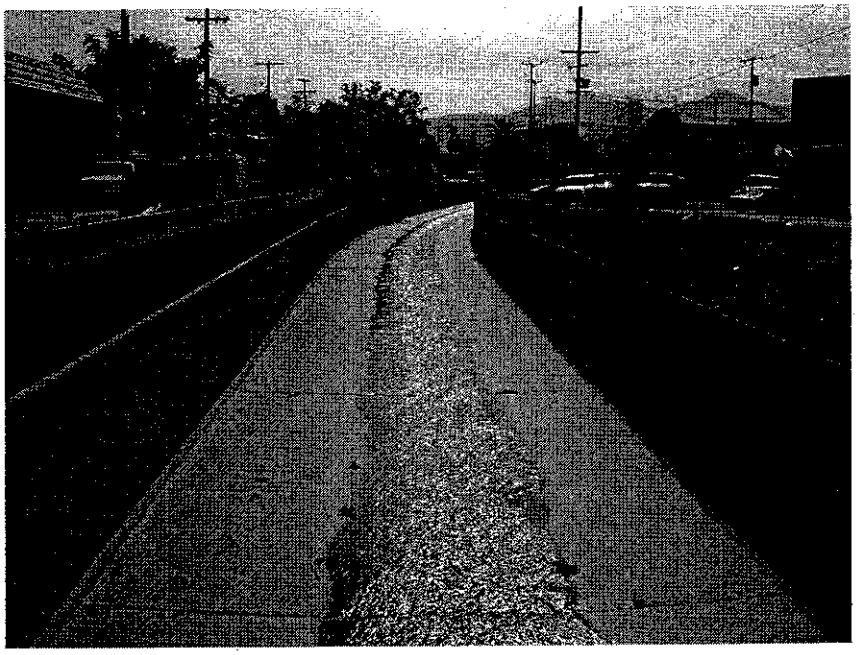
If algae related impairments downstream of the Tillman and Los Angeles/ Glendale WRPs are found to remain after the 2010 303(d) listing process, data collection and analysis similar to that described in Phases 1 and 2 should be conducted. Phase 1 can be skipped if the Regional Board works with the City of Los Angeles before 2010 in developing a scientifically based process for listing algae related impairments that clearly connects the impairments to algae levels.

Appendix A. Photographs of the Burbank WRP's Receiving Water Sampling Stations in the Burbank Western Channel

Station R1 - Upstream of Burbank WRP

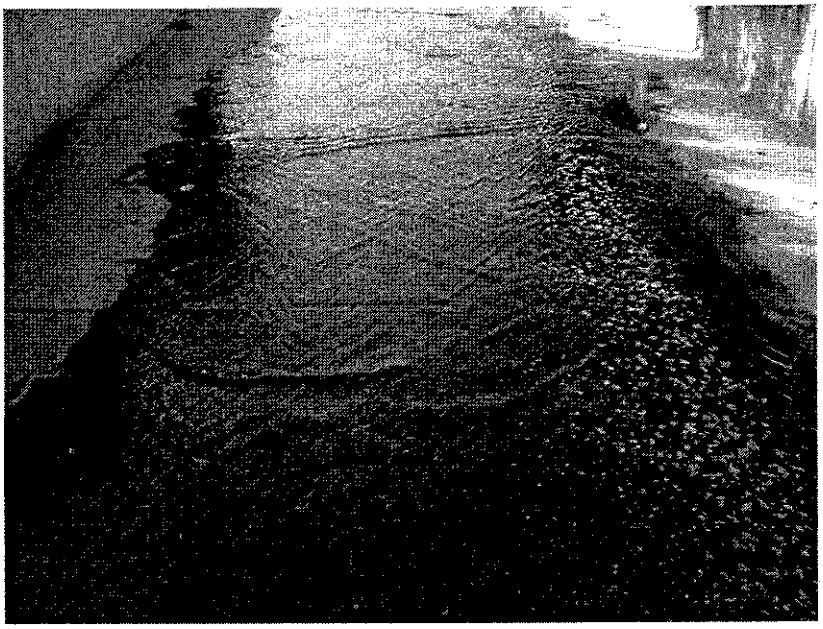
Photograph taken in February 2005

Station R2, Phases 1 and 2 Sampling Site - Downstream of Burbank WRP



Photograph taken in November 2003

Station R5 - Downstream of R2 and the Burbank WRP



Photograph taken in January 2004

Appendix B. Phase 1 Field Sheet

Field Observation Sheet for Nitrogen and Related Effects

Sampler's Name:
Location:
Date:
Time:

Instrumental Measurements

DO (mg/L)	Chlorine (mg/L)	Water Temp (°F)	pH	EC (mS/cm)	Light (uEinsteins/m2)	Riparian Cover

Beneficial Use Assessment

Contact Recreation	Noncontact Recreation	Wild Life	Photographs
None	Bicycling	Birds	1) 2) 3) 4) 5) 6) 7)
Wading Swimming	Walking/jogging Bird watching	Snails Crayfish Tadpoles Insects Other	

Description of Physical Characteristics

Previous Day's Weather	Today's Weather	Type of Flow	Dominant Substrate	Water Color	Turbidity
Clear	Clear	None Current Speed:	Concrete	Colorless	Clear
Overcast	Overcast	Width: Mid-Depth:	Rocks	Brownish	Cloudy
Foggy Drizzle Rain Storming	Foggy Drizzle Rain Storming	Riffle Pool Run	Silt Other	Reddish Greenish Olive Greenish Yellowish Bluish	Murky NTU:

Odor Observations

Odor Strength (using Nasal Ranger)	Odor Type
None Maximum dilution where odor is detected: Subjective observation on strength with no dilution:	Fishy Sewage Musty Chemical Horse/ Manure Petroleum Rotten Eggs Other:

Algae and Scum/ Foam Measurements and Observations

Transect # 1	Benthic Biofilm Thickness			Benthic Filamentous > 10 cm	Dominant Color	Floating Algae Present?	Dominant Color	Filamentous or Clumpy?	Foam/ Scum Present?	Associated with Algae?
	Thin slime	.5 -3 mm	> 3 mm							
Measurement 1										
Measurement 2										
Measurement 3										
Measurement 4										
Measurement 5										

Transect # 2	Benthic Biofilm Thickness			Benthic Filamentous > 10 cm	Dominant Color	Floating Algae Present?	Dominant Color	Filamentous or Clumpy?	Foam/ Scum Present?	Associated with Algae?
	Thin slime	.5 -3 mm	> 3 mm							
Measurement 1										
Measurement 2										
Measurement 3										
Measurement 4										
Measurement 5										

Transect # 3	Benthic Biofilm Thickness			Benthic Filamentous > 10 cm	Dominant Color	Floating Algae Present?	Dominant Color	Filamentous or Clumpy?	Foam/ Scum Present?	Associated with Algae?
	Thin slime	.5 -3 mm	> 3 mm							
Measurement 1										
Measurement 2										
Measurement 3										
Measurement 4										
Measurement 5										

Transect # 4	Benthic Biofilm Thickness			Benthic Filamentous > 10 cm	Dominant Color	Floating Algae Present?	Dominant Color	Filamentous or Clumpy?	Foam/ Scum Present?	Associated with Algae?
	Thin slime	.5 -3 mm	> 3 mm							
Measurement 1										
Measurement 2										
Measurement 3										
Measurement 4										
Measurement 5										

Transect # 5	Benthic Biofilm Thickness			Benthic Filamentous > 10 cm	Dominant Color	Floating Algae Present?	Dominant Color	Filamentous or Clumpy?	Foam/ Scum Present?	Associated with Algae?
	Thin slime	.5 -3 mm	> 3 mm							
Measurement 1										
Measurement 2										
Measurement 3										
Measurement 4										
Measurement 5										

Miscellaneous Notes

List any special circumstances, problems, observations, or unusual occurrences.

Field Key for Algae Measurements

Benthic Algae Thickness	Descriptors
Thin slime	Can't see layer but feel it
<1 mm	See it but can't measure
>1 mm	Can easily measure with ruler

Phase 1 Monitoring Protocol for the Workplan for the Evaluation of the Effectiveness of Nitrogen Loading Reductions in Removing Algae-Related Impairments in the Los Angeles River Watershed

Overview

Sampling will take place monthly, at least two weeks after any significant rain or flooding event. Physical and chemical measurements, and algae and scum/foam measurements and observations, will be made each month. If a storm event precludes a sampling event from taking place in one month, two events will take place during the following month but at least two weeks apart. Field data and observations will be recorded on a field sheet shown in Appendix B of the workplan submitted to the Regional Board on March 31, 2005. Measurements and photographs should be taken in the order presented below.

Location of Sampling Site

Field events will take place at the Burbank WRP's receiving water station, R2. Please see attached map for location and driving directions.

Odor Measurements

Sam Unger of the Regional Board will be notified 48 hours in advance of each field event by both voicemail and email. He can be reached at (213) 576-6784 and sunger@waterboards.ca.gov. Staff from the Regional Board will be present, if they are available, to help determine if odors are problematic. It is possible that decaying algae odors will not be a problem at any of the events, but if they are detected, the strength of the odor causing an aesthetic impairment will be determined by the people present at the time. This strength will be identified by moving toward or away from the odor source until a problem level is selected by the group. Once the strength has been determined, a Nasal Ranger will be used to determine the maximum dilution (with filtered air) where the odor can still be detected. The Nasal Ranger will be calibrated to the nose of one or both of the field crew regularly at the field events. These same staff persons must be at all field events to ensure consistency. Once the Nasal Ranger has been calibrated, it can be used to identify impairments due to decaying algae if Regional Board staff are not present.

Directions for using the Nasal Ranger are attached to this protocol.

Photographs

Take photographs at the beginning of the event before the site is disturbed by field crew. Establish a permanent point at the downstream end of the transects. Take at least one picture facing upstream from this point on each sampling date. Also take photos of any scum or foam observed at the site, and anything else noted in the "special circumstances, problems, observations, or unusual occurrences" section of the data sheet. For close-up photographs include a ruler to show the scale.

Indicate on the field sheet the number of the photograph and its content. The first photograph taken will be #1. Include the number and content of every photograph taken. Write "mistake" next to the number for any photographs that should not be part of the official record.

Algae and Scum/Foam Measurements and Observations

Establish the locations for five cross-stream transects. All transects should be located downstream of R2. To avoid recently disturbed areas of the stream, the first transect should start at least 2 meters upstream of where the stream bottom has been obviously scraped or disturbed. Each subsequent transect will occur 10 meters upstream of the previous one. Thus, Transect #1 will be the furthest downstream, and Transect #5 will be furthest upstream. If any transect falls under an overpass, it should be moved upstream until it is out of range of the artificial shade of the overpass.

Lay a transect tape across the first transect. Record the wetted width of the stream at this point (not the entire channel width – only where there is water), and make a note of any special circumstances, problems, observations, or unusual occurrences.

Begin measuring algae, scum, and foam across the first transect using the point-contact method. There should be at least ten points recorded on each transect, so the intervals between points will change depending on the width of the stream. If the stream is greater than 5 meters wide, take a measurement at each half meter (0.5m, 1m, 1.5m, etc.). If the stream is between 2 and 5 meters wide, take a measurement every 20 cm (i.e. 0.2m, 0.4m, 0.6m, 0.8m, etc.). If the stream is between 1 and 2 meters wide, take measurements every 10 cm (i.e. 10cm, 20cm, 30cm, 40cm, etc.). If the stream is less than 1 meter in width, take measurements every 5 cm.

Wetted width of stream	Distance between points	Example	# of points
> 5 meters	50 cm	0.5m, 1m, 1.5m, 2m, 2.5m	> 10
2 – 5 meters	20 cm	20cm, 40cm, 60cm, 80cm	10 – 25
1 – 2 meters	10 cm	10cm, 20cm, 30cm, 40cm, 50cm	10 – 20
< 1 meter	5 cm	5cm, 10cm, 15cm, 20cm	< 20

At each point, record what kinds of algae are present under that exact spot, including both benthic and floating filamentous algae and floating unattached mats. If there is only a benthic biofilm present, record the color and thickness class (thin slime, 0.5-3 mm, or >3mm). If filamentous algae are present, record the color and length class (less than or greater than 10 cm). If floating algae mats are present, record the color and general morphology (filamentous or clumpy). If floating algae, filamentous or unattached mats, are present, check underneath them to see what is growing on the benthic surface beneath. Thickness of biofilms and length of filamentous algae can be measured using a standard ruler.

Record the presence of scum and or foam that is associated with floating algae, and photograph it. If scum and/or foam are found repeatedly over the course of the study, there will be photographs available to help identify foam and scum associated with algae for future events in order to ensure consistency.

Physical and Chemical Measurements

DO, Temp, pH , turbidity, and EC: Field measurements for turbidity, conductivity, temperature, pH, and dissolved oxygen should be taken each time the station is sampled. Turbidity may be measured at a local laboratory. If grab samples are taken for turbidity, field measurements should be made at the grab sample collection location after the grab sample has been collected.

The field measurements should be taken at approximately mid-stream and mid-depth at the location of greatest flow (if feasible). Field probes should be lowered to approximately mid-depth; readings should be

taken and recorded on the field log. If at any time the collection of field measurements by wading appears unsafe, do not attempt to collect mid-stream, mid-depth measurements. If in-stream field measurements are not safe, collect field measurements from a stable, unobstructed area at the stream's edge.

Residual Chlorine: Measure chlorine using the Hach Pocket Colorimeter. Staff from the City of Burbank might assist with this measurement.

Light measurement: Light measurement should be taken at 12:00 noon on each sampling date. Light measurements will be made with a light meter. Five measurements will be taken, one in the center of each cross-stream transect, and averaged for a site estimate.

Percent cover by spherical densiometer: Because there is no riparian shading at the sampling site, this step is only necessary during one field event to ascertain shading due to the walls of the channel. Hold the densiometer level, as close to the water's surface as possible, 12"–18" inches in front of your body. Count the number of grid intersections in which any kind of canopy cover appears (there are a total of 37 grid intersections). Take four readings in this way, each time standing in the same spot but facing upstream, right, left, and downstream. Multiply the results for each direction by 2.7 to get percent cover, then average the results for the four directions.

Beneficial Use Assessment: Appropriate characteristics should be selected in the second row of the field sheet describing the beneficial uses.

Description of Physical Characteristics: Appropriate characteristics should be selected in the third row of the field sheet describing the physical characteristics.

Flow measurements: Current velocity and depth will be measured using a flow meter, as long as depths are sufficient to adequately cover the probe, approximately 2 ½ inches. Depth and velocity will be measured at three equidistant points along a transect of the stream, with the center point at the middle of the stream. Width will be measured by extending a tape measure from one side of the stream to the other.

If stream depth is inadequate to use the flow meter, current velocity will be estimated by measuring and averaging the time it takes a floating object (e.g. stick, orange) to travel a known distance, preferably 10 ft., at least three times. Depth will be measured with a ruler or other suitable measuring device at three equidistant points along a transect of the stream, with the center point at the middle of the stream. Width will be measured by extending a tape measure from one side of the stream to the other

Submittal of Field Sheet

Submit the completed field sheet to the person designated to enter the data into the database. Make sure the field sheet includes the names of the people recording the observations, the location, and the date.

Equipment Checklist

Flow meter
Turbidity meter
Chlorine kit
Camera
Probe for pH, Temp, EC, and DO
Transect tape
Densiometer
Light meter
Ruler
Pencil
Clipboard
Field sheet

ATTACHMENT 3a. PHASE 1 ALGAE STUDY SAMPLING RESULTS: PHYSICAL AND ODOR

Event Information							Chemical and Physical Parameters													Descriptive Characteristics				
ProjectID	SiteTag	Event Number	Event Month	Event Date	SampleTime	Sampler_Name	Air Temperature (degrees C)	Dissolved Oxygen (ppm)	Chlorine (mg/L)	Water Temperature (degrees C)	pH	Conductivity (uS)	Salinity (ppt)	Light (uE) 1	Light (uE) 2	Light (uE) 3	Light Time	Turbidity (NTUs)	Flow Width (m)	Flow Depth [center of channel]	Current Speed (ft/s) [center of channel]	Contact Recreation	Noncontact Recreation	Wildlife	Previous Day's Weather	
BU	R2	1	April	04/20/05	13:20	G. Reide, J. Simpson		8.15	<.1	24.1	6.85	858	0.425	1885	1887	1850	12:00	4.94	13'	0.5'	6.91	None	None	Birds, leeches	Clear	
BU	R2	2	June	06/01/05	12:11	G. Reide, J. Simpson		6.94	<.1	23.4	7.23	905	0.451	830	na	na	12:11	2.92	12.5'	0.4	5.40	None	walking	Birds, midge larvae	Overcast	
BU	R2	3	June	06/29/05	11:00	G. Reide, J. Simpson, Landau		7.54	<.1	26.91	7.58	947	0.477	No readings				2.50	12.75'	0.5	6.90	None	walking, on bridge overhead	Birds, midge larvae	Clear	
BU	R2	4	July*	07/20/05	11:00	G. Reide, J. Simpson		12.83	<.1	28.46	8.43	990	0.500	1805	1807	1815	12:00	2.81	4.6m	0.5	5.42	None	None	Birds, midge larvae	Warm, Humid	War
BU	R2	5	August	08/24/05	11:00	G. Reide, J. Simpson, Anderson, Yoshida		11.87	<.1	28.09	7.92	1123	0.570	1840	1847	1846	12:07	2.45	3.8m	0.5	5.72	None	None	Birds, midge larvae	Very Warm & Sunny, clear	Wa
BU	R2	6	October	10/04/05	11:30	G. Reide, J. Simpson, R. Andersen		11.23	<.1	26.76	8.27	1162	0.550	1501	1465	1490		1.25	15.1'	0.5'	4.72	None	None	Birds, chironomid larvae	clear	
BU	R2	7	October	10/31/05	11:15	Reide, Anderson, Simpson		12.53	<.1	25.80	8.35	914	0.440	No readings				1.79	12.5'	0.5'	5.50	None	None	pigeons	clear, sunny, warm	cl

* Starting with July 20 Event, Transect 5 was moved 35 meters upstream to a position out of the potential shadow of the Verdugo Ave. bridge.

ATTACHMENT 3b. PHASE 1 ALGAE STUDY SAMPLING RESULTS: FOAM / SCUM PRESENT

Foam/scum present

ProjectID	SiteTag	Event Number	Event Month	Event Date	Sample Time	Sampler_Name	Transect 1																									Transect 2																									
							1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	1
BU	R2	1	April	04/20/05	13:20	G. Reide, J. Simpson	0	0	0	0	0	0	0	0	0																	0	0	0	0	0	0	0	0																			0
BU	R2	2	June	06/01/05	12:00	G. Reide, J. Simpson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					0
BU	R2	3	June	06/29/05	11:00	G. Reide, J. Simpson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					0
BU	R2	4	July*	07/20/05	11:00	G. Reide, J. Simpson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					0
BU	R2	5	August	08/24/05	11:00	G. Reide, J. Simpson, Anderson, Yoshida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				0
BU	R2	6	October	10/04/05	11:20	G. Reide, J. Simpson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				0
BU	R2	7	October	10/31/05	11:15	Reide, Anderson, Simpson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					0

Foam/ scum associated with algae

ProjectID	SiteTag	Event Number	Event Month	Event Date	Sample Time	Sampler_Name	Transect 1																									Transect 2																									
							1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	1
BU	R2	1	April	04/20/05	13:20	G. Reide, J. Simpson	0	0	0	0	0	0	0	0	0																	0	0	0	0	0	0	0	0					0													0
BU	R2	2	June	06/01/05	12:00	G. Reide, J. Simpson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					0
BU	R2	3	June	06/29/05	11:00	G. Reide, J. Simpson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					0
BU	R2	4	July*	07/20/05	11:00	G. Reide, J. Simpson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					0
BU	R2	5	August	08/24/05	11:00	G. Reide, J. Simpson, Anderson, Yoshida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				0
BU	R2	6	October	10/04/05	11:20	G. Reide, J. Simpson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				0
BU	R2	7	October	10/31/05	11:15	Reide, Anderson, Simpson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					0

* Starting with July 20 Event, Transect 5 was moved 35 meters upstream to a position out of the potential shadow of the Verdugo Ave. bridge.

Foam/scum present

19	20	21	22	23	24	25
0	0					
0	0					
0	0	0				
0	0	0	0			
0	0	0				

Transect 4

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
0***	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					

Foam/scum present

Transect 5

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
0	0	0	0	0	0	0	0	0																
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*							
0**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					

Foam/ scum associated with algae

19	20	21	22	23	24	25
0	0					
0	0					
0	0	0				
0	0	0	0			
0	0	0				

Transect 4

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					

Foam/ scum associated with algae

Transect 5

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
0	0	0	0	0	0	0	0	0																
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*							
0**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					

*** 20 cm apart

** site 5A - 35 yards upstream Verdugo

ATTACHMENT 3c. PHASE 1 ALGAE STUDY SAMPLING RESULTS: FLOATING ALGAE PRESENT

Floating Algae Present

Transect 1

Event Number	Event Month	Event Date	SampleTime	Sampler Name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1	April	04/20/05	13:20	G. Reide, J. Simpson	0	0	0	0	0	0	0	0	0																
2	June	06/01/05	12:00	G. Reide, J. Simpson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
3	June	06/29/05	11:00	G. Reide, J. Simpson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
4	July*	07/20/05	11:00	G. Reide, J. Simpson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
5	August	08/24/05	11:00	G. Reide, J. Simpson, Anderson, Yoshida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
6	October	10/04/05	11:10	G. Reide, J. Simpson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
7	October	10/31/05	11:15	Reide, Anderson, Simpson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			

Floating Algae Present

Transect 2

Event Number	Event Month	Event Date	SampleTime	Sampler Name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1	April	04/20/05	13:20	G. Reide, J. Simpson	0	0	0	0	0	0	0	0																	
2	June	06/01/05	12:00	G. Reide, J. Simpson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
3	June	06/29/05	11:00	G. Reide, J. Simpson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
4	July*	07/20/05	11:00	G. Reide, J. Simpson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
5	August	08/24/05	11:00	G. Reide, J. Simpson, Anderson, Yoshida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
6	October	10/04/05	11:10	G. Reide, J. Simpson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
7	October	10/31/05	11:15	Reide, Anderson, Simpson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			

Floating Algae Color

Floating Algae Color

Transect 1

Event Number	Event Month	Event Date	SampleTime	Sampler Name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1	April	04/20/05	13:20	G. Reide, J. Simpson																									
2	June	06/01/05	12:00	G. Reide, J. Simpson																									
3	June	06/29/05	11:00	G. Reide, J. Simpson																									
4	July*	07/20/05	11:00	G. Reide, J. Simpson																									
5	August	08/24/05	11:00	G. Reide, J. Simpson, Anderson, Yoshida																									
6	October	10/04/05	11:10	G. Reide, J. Simpson																									
7	October	10/31/05	11:15	Reide, Anderson, Simpson																									

Floating Algae Color

Transect 2

Event Number	Event Month	Event Date	SampleTime	Sampler Name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1	April	04/20/05	13:20	G. Reide, J. Simpson	0	0	0	0	0	0	0	0																	
2	June	06/01/05	12:00	G. Reide, J. Simpson														0											
3	June	06/29/05	11:00	G. Reide, J. Simpson																									
4	July*	07/20/05	11:00	G. Reide, J. Simpson																									
5	August	08/24/05	11:00	G. Reide, J. Simpson, Anderson, Yoshida																									
6	October	10/04/05	11:10	G. Reide, J. Simpson																									
7	October	10/31/05	11:15	Reide, Anderson, Simpson																									

Filamentous or Clumpy (F or C)

Filamentous or Clumpy (F or C)

Transect 1

Event Number	Event Month	Event Date	SampleTime	Sampler Name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1	April	04/20/05	13:20	G. Reide, J. Simpson																									
2	June	06/01/05	12:00	G. Reide, J. Simpson																									
3	June	06/29/05	11:00	G. Reide, J. Simpson																									
4	July*	07/20/05	11:00	G. Reide, J. Simpson																									
5	August	08/24/05	11:00	G. Reide, J. Simpson, Anderson, Yoshida																									
6	October	10/04/05	11:10	G. Reide, J. Simpson																									
7	October	10/31/05	11:15	Reide, Anderson, Simpson																									

Filamentous or Clumpy (F or C)

Transect 2

Event Number	Event Month	Event Date	SampleTime	Sampler Name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1	April	04/20/05	13:20	G. Reide, J. Simpson																									
2	June	06/01/05	12:00	G. Reide, J. Simpson																									
3	June	06/29/05	11:00	G. Reide, J. Simpson																									
4	July*	07/20/05	11:00	G. Reide, J. Simpson																									
5	August	08/24/05	11:00	G. Reide, J. Simpson, Anderson, Yoshida																									
6	October	10/04/05	11:10	G. Reide, J. Simpson																									
7	October	10/31/05	11:15	Reide, Anderson, Simpson																									

* Starting with July 20 Event, Transect 5 was moved 35 meters upstream to a position out of the potential shadow of the Verdugo Ave. bridge.

gae Present

ansect 3

13	14	15	16	17	18	19	20	21	22	23	24	25
0	0	0	0	0	0	0	0					
0	0	0	0	0	0	0	0					
0	0	0	0	0	0	0	0	0				
0	0	0	0	0	0	0	0	0	0			
0	0	0	0	0	0	0	0	0				
0	0	0	0	0	0							

Floating Algae Present

Transect 4

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					

Floating Algae Present

Transect 5

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
0	0	0	0	0	0	0	0	0												
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*			
0**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

gae Color

ansect 3

13	14	15	16	17	18	19	20	21	22	23	24	25

Floating Algae Color

Transect 4

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

Floating Algae Color

Transect 5

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21

umpy (F or C)

ansect 3

13	14	15	16	17	18	19	20	21	22	23	24	25

Filamentous or Clumpy (F or C)

Transect 4

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

Filam Filamentous or Clumpy (F or C)

Transect 5

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21

** site 5A - 35 yards upstream Verdugo

ATTACHMENT 3d. PHASE 1 ALGAE STUDY SAMPLING RESULTS: BENTHIC BIOFILM > 3 mm

Benthic Biofilm > 3mm — Transect 1

ProjectID	SiteTag	Event Number	Event Month	Event Date	SampleTime	Sampler_Name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
BU	R2	1	April	04/20/05	13:20	G. Reide, J. Simpson	0***	0	0	0	0	0	0	0	0																
BU	R2	2	June	06/01/05	12:00	G. Reide, J. Simpson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
BU	R2	3	June	06/29/05	11:00	G. Reide, J. Simpson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
BU	R2	4	July*	07/20/05	11:00	G. Reide, J. Simpson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
BU	R2	5	August	08/24/05	11:00	G. Reide, J. Simpson, Anderson, Yoshida	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
BU	R2	6	October	10/04/05	11:20	G. Reide, J. Simpson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
BU	R2	7	October	10/31/05	11:15	Reide, Anderson, Simpson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						

Benthic Biofilm > 3mm — Transect 2

Event Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1	0	0	0	0	0	0	0	0													
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		

Benthic Fillamentous > 10 cm — Transect 1

ProjectID	SiteTag	Event Number	Event Month	Event Date	SampleTime	Sampler_Name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
BU	R2	1	April	04/20/05	13:20	G. Reide, J. Simpson	0	0	0	0	0	0	0	0	0																
BU	R2	2	June	06/01/05	12:00	G. Reide, J. Simpson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
BU	R2	3	June	06/29/05	11:00	G. Reide, J. Simpson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
BU	R2	4	July*	07/20/05	11:00	G. Reide, J. Simpson	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0		
BU	R2	5	August	08/24/05	11:00	G. Reide, J. Simpson, Anderson, Yoshida	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
BU	R2	6	October	10/04/05	11:20	G. Reide, J. Simpson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
BU	R2	7	October	10/31/05	11:15	Reide, Anderson, Simpson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						

Benthic Fillamentous > 10 cm — Transect 2

Event Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1	0	0	0	0	0	0	0	0													
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		

Benthic biofilm color — Transect 1

ProjectID	SiteTag	Event Number	Event Month	Event Date	SampleTime	Sampler_Name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
BU	R2	1	April	04/20/05	13:20	G. Reide, J. Simpson	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r																
BU	R2	2	June	06/01/05	12:00	G. Reide, J. Simpson	green	green	green	green	green	green	green	green	green	brown	brown	brown	brown	brown	brown	brown	brown	brown	brown	brown	brown	brown			
BU	R2	3	June	06/29/05	11:00	G. Reide, J. Simpson	green	green			green	green	green	green	green	green	green	green	green	green	green	green	green	green	green	green	green				
BU	R2	4	July*	07/20/05	11:00	G. Reide, J. Simpson	green	green	green	green		green	green	green	green	green	green	green		green	green	green	green	green	green	green	green	brown	brown		
BU	R2	5	August	08/24/05	11:00	G. Reide, J. Simpson, Anderson, Yoshida	green	green	green	green	green			green	green	green	green	green	green	green		green	green	green	green	green	green	brown	brown		
BU	R2	6	October	10/04/05	11:20	G. Reide, J. Simpson	green	brown	brown	green	green		green	green			green	green				green	brown	brown	brown	brown	brown	brown			
BU	R2	7	October	10/31/05	11:15	Reide, Anderson, Simpson	brown	green	green	green	green	green	green	green	green	green	green		green	green	green	brown	brown	brown	brown						

Benthic biofilm color — Transect 2

Event Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r													
2	green	green	green	green	green	green	green	green	green	green	green	brown	brown	brown	brown	brown	brown	brown	brown	brown	brown
3	green				green	green	green	green	green	green	green	green	green	green	green	green	green	brown	green	green	
4	brown	brown	green	green	green		green	green	green	green			green	green	green	green	green	green	green	green	green
5	green	green	green	green					green	green	green	green	green	green	green	green	green	green	green	brown	brown
6	green	brown	brown	green	green	green				green		green	green			green	brown	brown	brown	brown	brown
7	brown	green	green	green	green		green	green		green	green	green	green	brown	brown	brown	brown	brown			
								n/r													

Benthic Fillamentous color — Transect 1

ProjectID	SiteTag	Event Number	Event Month	Event Date	SampleTime	Sampler_Name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
BU	R2	1	April	04/20/05	13:20	G. Reide, J. Simpson																									
BU	R2	2	June	06/01/05	12:00	G. Reide, J. Simpson																									
BU	R2	3	June	06/29/05	11:00	G. Reide, J. Simpson			green	green																					
BU	R2	4	July*	07/20/05	11:00	G. Reide, J. Simpson					green								green												
BU	R2	5	August	08/24/05	11:00	G. Reide, J. Simpson, Anderson, Yoshida						green	green								green										
BU	R2	6	October	10/04/05	11;20	G. Reide, J. Simpson						green			green	green			green	green	green										
BU	R2	7	October	10/31/05	11:15	Reide, Anderson, Simpson												green													

Benthic Fillamentous color — Transect 2

Event Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1																					
2																					
3		green	green	green																	
4						green					green	green									
5					green	green	green	green													
6							green	green	green		green			green	green						
7						green			green												

* Starting with July 20 Event, Transect 5 was moved 35 meters upstream to a position out of the potential shadow of the Verdugo Ave. bridge.

*** recordings every 50 cm rather than 20

Benthic Biofilm > 3mm

Transect 3

12	13	14	15	16	17	18	19	20	21	22	23	24	25
0	0	0	0	0	0	0	0	0					
0	0	0	0	0	0	0	0	0					
0	0	0	0	0	0	0	0	0	0				
0	0	0	0	0	0	0	0	0	0	0			
0	0	0	0	0	0	0	0	0	0				
0	0	0	0	0	0	0							

Benthic Biofilm > 3mm

Transect 4

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					

Benthic Biofilm > 3mm

Transect 5

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
0	0	0	0	0	0	0	0	0														
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			

Benthic Fillamentous > 10 cm

Transect 3

12	13	14	15	16	17	18	19	20	21	22	23	24	25
0	0	0	0	0	0	0	0	0					
0	0	0	0	0	0	0	0	0					
1	0	0	0	0	0	0	0	0	0				
0	0	0	0	0	0	0	0	0	0	0			
0	0	0	0	0	0	0	0	0	0				
0	0	0	0	0	0	0							

Benthic Fillamentous > 10 cm

Transect 4

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					

Benthic Fillamentous > 10 cm

Transect 5

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
0	0	0	0	0	0	0	0	0														
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
0*	0*	0*	0*	0*	0*	0*	0*	0*	1	0*	0*	0*	0*	0*	0*	0*	0*					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			

Benthic biofilm color

Transect 3

12	13	14	15	16	17	18	19	20	21	22	23	24	25
green	brown	brown	brown	brown	brown	brown	brown	brown					
green	green	green	green	green	brown	brown	brown	brown					
	green	green	green	green	green	green	brown	green	brown				
green	green	green	green	green	green	brown	brown	green	green	brown			
		green	green		green	green	brown	brown	brown				
green	green	green	brown	brown	brown	brown							

Benthic biofilm color

Transect 4

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r		
green	green	green	green	green	green	green	green	green	green	green	green	green	brown	brown	brown	brown	brown	brown	brown	brown	brown	brown		
green		green		green	green	green	green	green	green	green	green	green	green	green	green	green	brown	green	brown	green				
green	green	green	green	green	green	green		green	green	green	green	green	green	green	green	green	green	green	green	green	green	green		
green	green	green	green	green	green	green		green	green	green	green	green	green	green	green	green	green	green	green	green	brown	brown	green	
brown	brown	brown	green	green	green	green				green				green			green		green	brown	brown	brown	brown	
brown	brown	green	green	green	green	green		green		green	green	green	green	green		brown	brown	brown	brown					

Benthic biofilm color

Transect 5

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r														
green	green	green	green	green	green	green	green	green	green	green	brown	brown	brown	brown	brown	brown	brown	brown	brown	brown		
green	green	green	green	green	green	green	green	green	green	green	green	green	green	green	green	green	brown	brown	brown			
	green	green		green	green	green	green	green		green	green	green	green	green	green	green	green					
green	green	brown	green	green	green			green	green	green	green	green	green	green	green	green		green	green	green	green	green
brown	green	brown	brown	green	green								green			green	green	green	brown	brown	brown	brown
brown	brown	green	green		green	green	green	green			brown	green	brown	green	green	brown	brown	brown	brown			

ic Fillamentous color

Transect 3

12	13	14	15	16	17	18	19	20	21	22	23	24	25
green													
green	green			green									

Benthic Fillamentous color

Transect 4

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
	green		green																					
							green																	
							green																	
							green	green	green		green	green	green		green	green		green						
							green		green						green									

Benthic Fillamentous color

Transect 5

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
green			green						green													
						green	green										green					
						green	green	green	green	green	green	green		green	green							
				green					green	green												

Ammonia in the Burbank Western Channel

Entity Providing Information: City of Burbank

Contact Person: Rodney Andersen
275 E. Olive Ave., Burbank, CA, 91510
randersen@ci.burbank.ca.us

#	Date	Station	Ammonia (NH_3-N) Actual Result (mg/L as N)	Ammonia (NH_3-N) MDL (mg/L as N)	Ammonia (NH_3-N) PQL (ug/L)	Ammonia (NH_3-N) Conversion (mg/L as NH3)	pH Actual Result pH units	pH PQL (ug/L)	Temperature Actual Result °F	Temperature PQL °F	Temperature Conversion °C	Comparison to 2002 BPA
1	5/6/2003	R1	<0.05	0.02	0.05	<0.06	9.4	0.1	70	0.1	21.1	unknown
2	5/6/2003	R2	0.1	0.02	0.05	0.12	7.5	0.1	74	0.1	23.3	Meets WQO
3	5/6/2003	R5	0.1	0.02	0.05	0.12	8.3	0.1	74	0.1	23.3	Meets WQO
4	8/5/2003	R1	0.3	0.02	0.05	0.36	8.9	0.1	73.4	0.1	23.0	*above WQO*
5	8/5/2003	R2	0.2	0.02	0.05	0.28	7.5	0.1	84	0.1	28.9	Meets WQO
6	8/5/2003	R5	0.3	0.02	0.05	0.36	5.8	0.1	86	0.1	30.0	Meets WQO
7	11/6/2003	R1	0.1	0.02	0.05	0.12	9.3	0.1	61	0.1	16.1	unknown
8	11/6/2003	R2	0.2	0.02	0.05	0.26	7.5	0.1	76	0.1	24.4	Meets WQO
9	11/6/2003	R5	0.2	0.02	0.05	0.24	8.2	0.1	74	0.1	23.3	Meets WQO
10	2/10/2004	R1	0.2	0.01	0.1	0.24	8.5	0.1	61	0.1	16.1	Meets WQO
11	2/10/2004	R2	0.3	0.01	0.1	0.36	7.1	0.1	71	0.1	21.7	Meets WQO
12	2/10/2004	R5	0.3	0.01	0.1	0.36	7.6	0.1	73	0.1	22.8	Meets WQO
13	5/4/2004	R1	0.4	0.01	0.1	0.49	8.7	0.1	69	0.1	20.6	Meets WQO
14	5/4/2004	R2	0.3	0.01	0.1	0.36	6.6	0.1	79	0.1	26.1	Meets WQO
15	5/4/2004	R5	0.3	0.01	0.1	0.36	7.3	0.1	79	0.1	26.1	Meets WQO
16	8/4/2004	R1	0.2	0.01	0.1	0.24	8.9	0.1	69	0.1	20.6	Meets WQO
17	8/4/2004	R2	0.3	0.01	0.1	0.36	7.1	0.1	79.8	0.1	26.6	Meets WQO
18	8/4/2004	R5	0.2	0.04	0.1	0.24	7.9	0.1	80	0.1	26.7	Meets WQO
19	11/2/2004	R1	0.2	0.01	0.1	0.24	8.0	0.1	64.9	0.1	18.3	Meets WQO
20	11/2/2004	R2	0.2	0.01	0.1	0.22	6.6	0.1	71	0.1	21.7	Meets WQO
21	11/2/2004	R5	0.2	0.04	0.1	0.22	6.8	0.1	72.6	0.1	22.6	Meets WQO
22	2/15/2005	R1	0.1	0.02	0.1	0.12	8.1	0.1	59	0.1	15.0	Meets WQO
23	2/15/2005	R2	0.2	0.02	0.1	0.24	6.5	0.1	65	0.1	18.3	Meets WQO
24	2/15/2005	R5	0.2	0.04	0.1	0.24	6.3	0.1	64	0.1	17.8	Meets WQO
25	6/7/2005	R1	0.1	0.04	0.1	0.12	8.3	0.1	72	0.1	22.2	Meets WQO
26	6/14/2005	R1	0.2	0.04	0.1	0.24	8.0	0.1	69	0.1	20.6	Meets WQO
27	6/21/2005	R1	0.4	0.04	0.1	0.49	7.2	0.1	85	0.1	29.4	Meets WQO
28	8/9/2005	R1	0.6	0.04	0.1	0.73	8.7	0.1	71	0.1	21.7	*above WQO*
29	8/9/2005	R2	0.4	0.04	0.1	0.49	8.4	0.1	79	0.1	26.1	Meets WQO
30	8/9/2005	R5	0.4	0.04	0.1	0.49	8.1	0.1	74	0.1	23.3	Meets WQO
31	11/1/2005	R1	0.4	0.04	0.1	0.49	8.2	0.1	65.4	0.1	18.6	Meets WQO
32	11/1/2005	R2	0.3	0.04	0.1	0.36	7.3	0.1	73.4	0.1	23.0	Meets WQO
33	11/1/2005	R5	0.3	0.04	0.1	0.36	7.3	0.1	70.5	0.1	21.4	Meets WQO

Background Information:

R1 — *At the confluence of the Burbank Western Channel and Lockheed Channel about 50 feet above the Burbank Water Reclamation Plant*

R2 — *Burbank Western Wash at Verdugo Avenue*

R5 — *Burbank Western Wash just upstream from the confluence with the Los Angeles River*

2002 BPA — *2002 Basin Plan Amendment for Inland Surface Water Ammonia Objectives*

Attachme

Bob Hope Airport 2002-03

Attachment

KBUR DAILY DATA — OCT/2002

DAY	MAX	MIN	AVG	HDD/CDD	PCPN	SNOW	SNWG	PKWND	AVG
1	69	50	60	5	0.00	0.0	0	1716	5.8
2	72	48	60	5	0.00	0.0	0	1918	4.6
3	77	48	63	2	0.00	0.0	0	2015	4.1
4	81	47	64	1	0.00	0.0	0	1715	4.1
5	79	47	63	2	0.00	0.0	0	2215	4.1
6	82	55	69	4	0.00	0.0	0	2016	4.6
7	94	57	76	11	0.00	0.0	0	1016	4.5
8	90	57	74	9	0.00	0.0	0	1116	4.4
9	84	57	71	6	0.00	0.0	0	1114	5.1
10	76	58	67	2	0.00	0.0	0	1916	5.3
11	76	55	66	1	0.00	0.0	0	1815	4.5
12	76	53	65	0	0.00	0.0	0	1813	3.1
13	83	53	68	3	0.00	0.0	0	1118	4.6
14	76	56	66	1	0.00	0.0	0	1117	4.2
15	68	56	62	3	0.00	0.0	0	2014	4.6
16	69	55	62	3	0.00	0.0	0	1315	4.9
17	71	56	64	1	0.00	0.0	0	1915	4.8
18	69	52	61	4	0.00	0.0	0	1915	3.1
19	76	49	63	2	0.00	0.0	0	1813	3.4
20	72	50	61	4	0.00	0.0	0	0914	4.6
21	71	50	61	4	0.00	0.0	0	1714	3.7
22	66	48	57	8	0.00	0.0	0	2013	3.9
23	68	48	58	7	0.00	0.0	0	2015	3.8
24	65	56	61	4	0.00	0.0	0	2214	0.4
25	62	53	58	7	0.00	0.0	0	2212	2.8
26	68	52	60	5	0.00	0.0	0	1416	5.3
27	71	46	59	6	0.00	0.0	0	1916	0.3
28	71	44	58	7	0.00	0.0	0	1915	4.3
29	71	46	59	6	0.00	0.0	0	1914	4.4
30	72	44	58	7	0.00	0.0	0	2014	3.8
31	71	43	57	8	0.00	0.0	0	2810	2.4
Total:	74.1	51.3	62.7	101/ 37	0.00	0.0	0.0		
Deptr:	-8.2	-2.3	-5.8	71/ -93	-0.56	0.0			

KBUR DAILY DATA — NOV/2002

DAY	MAX	MIN	AVG	HDD/CDD	PCPN	SNOW	SNWG	PKWND	AVG
1	71	44	58	7	0.00	0.0	0	2214	2.3
2	79	43	61	4	0.00	0.0	0	1915	3.7
3	80	43	62	3	0.00	0.0	0	0813	3.8
4	72	45	59	6	0.00	0.0	0	1813	4.8
5	80	45	63	2	0.00	0.0	0	1512	3.2
6	83	46	65	0	0.00	0.0	0	1813	0.3
7	78	48	63	2	0.70	0.0	0	1322	5.1
8	68	49	59	6	0.35	0.0	0	1324	11.5
9	68	49	59	6	0.18	0.0	0	1121	4.8
10	77	54	66	1	0.00	0.0	0	3326	11.6
11	73	48	61	4	0.00	0.0	0	2418	4.4
12	85	49	67	2	0.00	0.0	0	3413	3.9
13	80	47	64	1	0.00	0.0	0	1813	3.1
14	81	47	64	1	0.00	0.0	0	0418	3.2
15	86	46	66	1	0.00	0.0	0	1013	0.3
16	86	46	66	1	0.00	0.0	0	2813	2.3
17	77	44	61	4	0.00	0.0	0	1013	2.7
18	84	43	64	1	0.00	0.0	0	3110	1.6
19	85	43	64	1	0.00	0.0	0	0215	2.5
20	90	46	68	3	0.00	0.0	0	1016	2.7
21	91	49	70	5	0.00	0.0	0	1214	2.4
22	82	49	66	1	0.00	0.0	0	0914	3.8
23	81	46	64	1	0.00	0.0	0	1114	3.5
24	72	47	60	5	0.00	0.0	0	1318	3.9
25	76	45	61	4	0.00	0.0	0	3653	10.2
26	76	57	67	2	0.00	0.0	0	0445	16.3
27	74	50	62	3	0.00	0.0	0	0428	0.6
28	82	52	67	2	0.00	0.0	0	0735	4.6
29	74	52	63	2	0.09	0.0	0	1817	4.4
30	75	42	59	6	0.00	0.0	0	0117	3.3
Total:	78.9	47.1	63.0	69/ 18	1.32	0.0	0.0		
Deptr:	5.0	1.9	2.9	-102/ 2	0.24	0.0			

KBUR DAILY DATA — DEC/2002

DAY	MAX	MIN	AVG	HDD/CDD	PCPN	SNOW	SNWG	PKWND	AVG
1	71	43	57	8	0.00	0.0	0	1810	1.3
2	74	42	58	7	0.00	0.0	0	2013	3.1
3	69	41	55	10	0.00	0.0	0	2115	2.3
4	74	41	58	7	0.00	0.0	0	1710	1.6
5	79	42	61	4	0.00	0.0	0	1710	1.8
6	71	44	58	7	0.00	0.0	0	1413	4.2
7	68	42	55	10	0.00	0.0	0	1713	3.1
8	77	43	60	5	0.00	0.0	0	1713	2.3
9	73	41	57	8	0.00	0.0	0	1212	3.3
10	72	41	57	8	0.00	0.0	0	3325	6.1
11	72	41	57	8	0.00	0.0	0	0232	7.3
12	73	41	57	8	0.00	0.0	0	1413	2.9
13	70	42	56	9	0.00	0.0	0	1714	2.1
14	70	42	56	9	0.00	0.0	0	1116	3.4
15	65	48	57	8	0.00	0.0	0	1214	2.7
16	67	45	56	9	1.33	0.0	0	1335	8.7
17	61	43	52	13	0.07	0.0	0	2837	4.4
18	62	34	48	17	0.00	0.0	0	3525	7.7
19	63	35	49	16	1.35	M	M	1326	7.9
20	63	44	54	11	0.00	0.0	M	1231	6.6
21	55	44	50	15	0.30	0.0	M	1417	0.3
22	66	43	55	10	0.00	0.0	M	0228	10.1
23	66	35	51	14	0.00	0.0	M	0516	0.0
24	58	34	46	19	0.00	0.0	M	1314	0.2
25	65	34	50	15	0.00	0.0	M	2409	1.6
26	65	32	49	16	0.00	0.0	M	1912	2.4
27	75	39	57	8	0.00	0.0	M	3314	3.9
28	66	41	54	11	0.27	0.0	0	2524	0.6
29	64	37	51	14	0.00	0.0	0	2821	6.5
30	64	40	52	13	0.00	0.0	0	1313	2.6
31	64	38	51	14	0.00	0.0	0	3421	4.6
Total:	67.8	40.4	54.1	331/ 0	3.32	0.0	0.0		
Deptr:	-0.4	-0.4	-0.9	15/ -2	1.09	0.0			

KBUR DAILY DATA — JAN/2003

DAY	MAX	MIN	AVG	HDD/CDD	PCPN	SNOW	SNWG	PKWND	AVG
1	72	37	55	10	0.00	0.0	0	1313	2.2
2	80	41	61	4	0.00	0.0	0	3313	3.4
3	85	46	66	1	0.00	0.0	0	3314	4.5
4	86	45	66	1	0.00	0.0	0	1014	2.1
5	89	47	68	3	0.00	0.0	0	0541	6.9
6	85	60	73	8	0.00	0.0	0	0453	17.8
7	84	54	69	4	0.00	0.0	0	0448	8.6
8	88	55	72	7	0.00	0.0	0	1216	3.5
9	73	45	59	6	0.00	0.0	0	1118	5.1
10	66	44	55	10	0.00	0.0	0	1809	0.1
11	70	41	56	9	0.00	0.0	0	1310	2.7
12	71	41	56	9	0.00	0.0	0	1614	2.3
13	78	41	60	5	0.00	0.0	0	0914	0.2
14	73	40	57	8	0.00	0.0	0	1214	1.8
15	74	40	57	8	0.00	0.0	0	1712	3.1
16	87	46	67	2	0.00	0.0	0	2815	5.5
17	86	44	65	0	0.00	0.0	0	2213	2.7
18	84	44	64	1	0.00	0.0	0	1713	2.6
19	84	43	64	1	0.00	0.0	0	1313	2.8
20	84	43	64	1	0.00	0.0	0	1017	0.4
21	76	47	62	3	0.00	0.0	0	1613	3.5
22	71	48	60	5	0.00	0.0	0	1213	2.3
23	79	51	65	0	0.00	0.0	0	2915	3.2
24	82	47	65	0	0.00	0.0	0	3525	10.6
25	84	50	67	2	0.00	0.0	0	3525	4.9
26	86	49	68	3	0.00	0.0	0	2110	2.8
27	90	46	68	3	0.00	0.0	0	1814	2.7
28	81	45	63	2	0.00	0.0	0	1012	2.3
29	77	44	61	4	0.00	0.0	0	2010	2.3
30	89	47	68	3	0.00	0.0	0	3113	2.5
31	93	51	72	7	0.00	0.0	0	1916	3.4
Total:	80.9	45.9	63.4	86/ 44	0.00	0.0	0.0		
Deptr:	12.8	4.4	8.1	-224/ 42	-3.55	0.0			

KBUR DAILY DATA FEB/2003

DAY	MAX	MIN	AVG	HDD/CDD	PCPN	SNOW	SNWG	PKWND	AVG
1	90	53	72	7	0.00	0.0	0	1915	4.6
2	79	46	63	2	0.00	0.0	0	3633	12.3
3	72	41	57	8	0.00	0.0	0	1117	3.3
4	70	39	55	10	0.00	0.0	0	1414	3.2
5	70	39	55	10	0.00	0.0	0	0425	4.2
6	66	36	51	14	0.00	0.0	0	1117	3.4
7	65	35	50	15	0.00	0.0	0	1418	3.5
8	64	41	53	12	0.00	0.0	0	1818	3.9
9	65	36	51	14	0.00	0.0	0	0608	0.2
10	68	41	55	10	0.03	0.0	0	0913	2.9
11	70	43	57	8	1.93	0.0	0	2718	4.5
12	57	45	51	14	3.66	0.0	0	1225	8.9
13	51	49	55	10	0.12	0.0	0	2012	2.6
14	65	47	56	9	0.00	0.0	0	2017	4.4
15	67	48	58	7	0.00	0.0	0	1809	4.3
16	66	50	58	7	0.00	0.0	0	2014	3.6
17	65	48	57	8	0.00	0.0	0	1812	3.7
18	66	43	55	10	0.00	0.0	0	1116	3.7
19	67	42	55	10	0.00	0.0	0	3429	8.1
20	65	44	55	10	0.00	0.0	0	3526	11.3
21	73	42	58	7	0.00	0.0	0	1814	4.2
22	72	43	58	7	0.00	0.0	0	2016	4.1
23	70	48	59	6	0.00	0.0	0	1415	4.4
24	65	50	58	7	0.58	0.0	0	1128	11.7
25	64	45	55	10	0.00	0.0	0	1426	7.1
26	59	39	49	16	0.07	0.0	0	2017	4.7
27	62	45	54	11	0.07	0.0	0	1115	3.4
28	60	42	51	14	0.00	0.0	0	1818	5.8
Total:	67.3	43.6	55.5	266/ 7	6.46	0.0	0.0		
Deptr:	-2.8	-0.3	-2.0	40/ 0	2.17	T			

KBUR DAILY DATA MAR/2003

DAY	MAX	MIN	AVG	HDD/CDD	PCPN	SNOW	SNWG	PKWND	AVG
1	66	43	55	10	0.00	0.0	0	1920	3.4
2	70	41	56	9	0.00	0.0	0	3530	6.3
3	70	42	56	9	0.00	0.0	0	1118	4.6
4	70	38	54	11	0.22	0.0	0	1217	0.5
5	68	38	53	12	0.00	0.0	0	1915	3.9
6	68	42	55	10	0.00	0.0	0	1918	3.4
7	71	41	56	9	0.00	0.0	0	1715	3.5
8	73	41	57	8	0.00	0.0	0	1813	3.1
9	77	44	61	4	0.00	0.0	0	1714	3.4
10	78	44	61	4	0.00	0.0	0	1714	3.7
11	75	47	61	4	0.00	0.0	0	0915	4.7
12	75	51	63	2	0.00	0.0	0	1114	5.1
13	75	51	63	2	0.00	0.0	0	1816	5.9
14	75	51	63	2	0.11	0.0	0	2016	4.8
15	72	50	61	4	2.67	0.0	0	1129	11.5
16	68	45	57	8	T	0.0	0	2625	6.7
17	65	46	56	9	0.00	0.0	0	3543	12.6
18	71	46	59	6	0.00	0.0	0	3230	12.8
19	68	48	58	7	0.00	0.0	0	3417	6.9
20	68	46	57	8	0.00	0.0	0	1118	4.6
21	68	47	58	7	0.00	0.0	0	1516	4.5
22	79	52	66	1	0.00	0.0	0	1614	3.7
23	72	54	63	2	0.00	0.0	0	1317	5.4
24	63	47	55	10	0.00	0.0	0	0917	5.9
25	71	50	61	4	0.00	0.0	0	1314	3.6
26	85	54	70	5	0.00	0.0	0	3539	13.7
27	86	53	70	5	0.00	0.0	0	3539	16.6
28	81	46	64	1	0.00	0.0	0	0328	7.8
29	80	47	64	1	0.00	0.0	0	1715	4.2
30	90	51	71	6	0.00	0.0	0	2015	3.6
31	88	51	70	5	0.00	0.0	0	2121	4.2
Total:	73.7	46.7	60.2	163/ 22	3.00	0.0	0.0		
Deptr:	2.5	1.0	1.2	-43/ 10	-0.94	0.0			

Hardness and Zinc in the Burbank Western Channel

Entity Providing Information:
City of Burbank
Contact Person: Rodney Andersen
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randersen@ci.burbank.ca.us

NPDES PERMIT NO. CA0055531, ORDER NO 96-050 (JUNE 1996 TO JUNE 1998):
METALS MONITORING REQUIRED SEMI-ANNUALLY, HARDNESS NOT REQUIRED.
NPDES PERMIT, ORDER 98-072 (JUNE 1998 TO PRESENT):
METALS AND HARDNESS REQUIRED QUARTERLY

					Hardness				Zinc				Comparison with CTR Water Quality Objectives			
#	Date	Time	Sampler	Station	Actual Result (mg/L as CaC03)	ML (mg/L)	MDL (mg/L)	RDL (mg/L)	Actual Result (ug/L)	ML (ug/L)	MDL (ug/L)	RDL (ug/L)	CF_{acute}	CMC (ug/L)	$CF_{chronic}$	CCC (ug/L)
1	11/17/1998	11:04 AM	JB/AL	R1	280	0.1	0.1	0.5	<50	1		50	0.978	280.4	0.986	282.7
2	11/17/1998	10:31 AM	JB/AL	R2	235	0.1	0.1	0.5	74	1		50	0.978	241.7	0.986	243.7
3	11/17/1998	9:45 AM	JB/AL	R5	247	0.1	0.1	0.5	<50	1		50	0.978	252.1	0.986	254.2
4	2/4/1999	9:15 AM	JB	R1	367	0.1	0.1	0.5	22	1		5	0.978	352.6	0.986	355.5
5	2/4/1999	8:10 AM	JB	R2	218	0.1	0.1	0.5	69	1		5	0.978	226.8	0.986	228.6
6	2/4/1999	7:50 AM	JB	R5	222	0.1	0.1	0.5	67	1		5	0.978	230.3	0.986	232.2
7	5/5/1999	7:40 AM	RC	R1	402**	0.1	0.1	0.5	37	1	1.6	5	0.978	379.3	0.986	382.4
8	5/5/1999	7:15 AM	RC	R2	283	0.1	0.1	0.5	67	1	1.6	5	0.978	282.9	0.986	285.2
9	5/5/1999	7:00 AM	RC	R5	290	0.1	0.1	0.5	81	1	1.6	5	0.978	288.8	0.986	291.2
10	8/2/1999	9:00 AM	RC	R1	296	0.1	0.1	0.5	<50	1		50	0.978	293.9	0.986	296.3
11	8/2/1999	8:30 AM	RC	R2	261	0.1	0.1	0.5	83	1		50	0.978	264.2	0.986	266.3
12	8/2/1999	8:00 AM	RC	R5	266	0.1	0.1	0.5	82	1		50	0.978	268.4	0.986	270.6
13	11/10/1999	7:30 AM	RC	R1	662**	0.1	0.1	0.5	27	1	0.89	10	0.978	379.3	0.986	382.4
14	11/10/1999	7:08 AM	RC	R2	256	0.1	0.1	0.5	75	1	0.89	10	0.978	259.9	0.986	262.0
15	11/10/1999	6:15 AM	RC	R5	301	0.1	0.1	0.5	81	1	0.89	10	0.978	298.1	0.986	300.5
16	2/15/2000	11:30 AM	CK/CT	R1	226	0.1	0.1	0.5	36	1		20	0.978	233.8	0.986	235.7
17	2/15/2000	11:15 AM	CK/CT	R2	191	0.1	0.1	0.5	57	1		20	0.978	202.8	0.986	204.4
18	2/15/2000	11:00 AM	CK/CT	R5	228	0.1	0.1	0.5	69	1		20	0.978	235.6	0.986	237.5
19	5/15/2000	7:00 AM	JB	R1	395	0.1	0.1	0.5	24	1	0.89	50	0.978	375.3	0.986	378.3
20	5/15/2000	6:20 AM	JB	R2	323	0.1	0.1	0.5	68	1	0.89	50	0.978	316.4	0.986	319.0
21	5/15/2000	7:40 AM	JB	R5	266	0.1	0.1	0.5	58	1	0.89	50	0.978	268.4	0.986	270.6
22	8/8/2000	8:00 AM	RC	R1	547**	0.1	0.1	0.5	420	1	0.89	50	0.978	379.3	0.986	382.4
23	8/8/2000	6:40 AM	RC	R2	275	0.1	0.1	0.5	88	1	0.89	50	0.978	276.1	0.986	278.4
24	8/8/2000	6:20 AM	RC	R5	337	0.1	0.1	0.5	94	1	0.89	50	0.978	328.0	0.986	330.7
25	11/2/2000	7:50 AM	JB	R1	316	0.1	0.1	0.5	<50	1	0.89	50	0.978	310.6	0.986	313.2
26	11/2/2000	6:55 AM	JB	R2	241	0.1	0.1	0.5	68	1	0.89	50	0.978	246.9	0.986	248.9
27	11/2/2000	6:40 AM	JB	R5	250	0.1	0.1	0.5	83	1	0.89	50	0.978	254.7	0.986	256.8
28	1/30/2001	7:43 AM	CH	R1	329	0.1	0.1	0.5	<50	1	0.89	50	0.978	321.4	0.986	324.1
29	1/30/2001	6:55 AM	CH	R2	220	0.1	0.1	0.5	66	1	0.89	50	0.978	228.6	0.986	230.4
30	1/30/2001	6:30 AM	CH	R5	229	0.1	0.1	0.5	70	1	0.89	50	0.978	236.5	0.986	238.4
31	5/2/2001	8:45 AM	RC	R1	347	0.1	0.1	0.5	39	1	0.89	50	0.978	336.3	0.986	339.0
32	5/2/2001	7:45 AM	RC	R2	226	0.1	0.1	0.5	76	1	0.89	50	0.978	233.8	0.986	235.7
33	5/2/2001	7:00 AM	RC	R5	254	0.1	0.1	0.5	81	1	0.89	50	0.978	258.1	0.986	260.3
34	7/31/2001	7:45 AM	SA	R1	400	0.1	0.1	0.5	32	1	0.89	50	0.978	379.3	0.986	382.4
35	8/8/2001	9:55 AM	SA	R1	386	0.1	0.1	0.5	45	1	0.89	50	0.978	368.0	0.986	371.0
36	8/8/2001	9:24 AM	SA	R2	216	0.1	0.1	0.5	81	1	0.89	50	0.978	225.0	0.986	226.9
37	8/8/2001	9:17 AM	SA	R5	222	0.1	0.1	0.5	92	1	0.89	50	0.978	230.3	0.986	232.2
38	8/22/2001	8:29 AM	SA	R1	333	0.1	0.1	0.5	42	1	0.98	50	0.978	324.7	0.986	327.4
39	9/4/2001	9:15 AM	JB	R1	244	0.1	0.1	0.5	46	1	0.89	50	0.978	249.5	0.986	251.6
40	10/2/2001	9:06 AM	JB	R1	312	0.1	0.1	0.5	68	1	0.98	50	0.978	307.3	0.986	309.8
41	10/31/2001	8:20 AM	JB	R1.5	239	0.1	0.1	0.5	76	1	0.89	50	0.978	245.2	0.986	247.2
42	11/2/2001	9:00 AM	JB	R1.5	236	0.1	0.1	0.5	66	1	0.89	50	0.978	242.6	0.986	244.5
43	11/2/2001	7:30 AM	JB	R1	310	0.1	0.1	0.5	77	1	0.89	50	0.978	305.6	0.986	308.1
44	11/6/2001	9:48 AM	SA	R1	338	0.1	0.1	0.5	51	1	0.89	50	0.978	328.9	0.986	331.5
45	11/6/2001	8:31 AM	SA	R2	248	0.1	0.1	0.5	68	1	0.89	50	0.978	253.0	0.986	255.0
46	11/6/2001	8:15 AM	SA	R5	260	0.1	0.1	0.5	72	1	0.89	50	0.978	263.3	0.986	265.5

R1:Burbank Western Wash (BWW) Lockheed Channel confluence, 50 ft above BWRP
R1.5:About 50 ft upstream of Burbank Power Plant 001 discharge
R2:BWW @Verdugo
R5:BWW upstream of LA River confluence

Attachment

Hardness and Zinc in the Burbank Western Channel

Entity Providing Information:
City of Burbank
Contact Person: Rodney Andersen
275 E. Olive Ave.
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randersen@ci.burbank.ca.us

NPDES PERMIT NO. CA0055531, ORDER NO 96-050 (JUNE 1996 TO JUNE 1998):
METALS MONITORING REQUIRED SEMI-ANNUALLY, HARDNESS NOT REQUIRED.
NPDES PERMIT, ORDER 98-072 (JUNE 1998 TO PRESENT):
METALS AND HARDNESS REQUIRED QUARTERLY

					Hardness				Zinc				Comparison with CTR Water Quality Objectives			
#	Date	Time	Sampler	Station	Actual Result (mg/L as CaC03)	ML (mg/L)	MDL (mg/L)	RDL (mg/L)	Actual Result (ug/L)	ML (ug/L)	MDL (ug/L)	RDL (ug/L)	CF_{acute}	CMC (ug/L)	$CF_{chronic}$	CCC (ug/L)
47	12/5/2001	8:55 AM	JB	R1	355	0.1	0.1	0.5	40	1	1.6	5	0.978	342.8	0.986	345.6
48	12/5/2001	8:45 AM	JB	R1.5	216	0.1	0.1	0.5	70	1	1.6	5	0.978	225.0	0.986	226.9
49	1/9/2002	9:15 AM	JB	R1	316	0.1	0.1	0.5	26	1	0.89	50	0.978	310.6	0.986	313.2
50	1/9/2002	8:55 AM	JB	R1.5	216	0.1	0.1	0.5	73	1	0.89	50	0.978	225.0	0.986	226.9
51	2/5/2002	9:45 AM	CH	R1	371	0.1	0.1	0.5	<50	1	0.89	50	0.978	355.9	0.986	358.8
52	2/5/2002	9:00 AM	CH	R2	234	0.1	0.1	0.5	66	1	0.89	50	0.978	240.8	0.986	242.8
53	2/5/2002	8:40 AM	CH	R5	243	0.1	0.1	0.5	74	1	0.89	50	0.978	248.6	0.986	250.7
54	2/6/2002	8:12 AM	RC	R1.5	229	0.1	0.1	0.5	63	1	0.89	50	0.978	236.5	0.986	238.4
55	2/13/2002	8:30 AM	RC	R1	369	0.1	0.1	0.5	26	1	0.89	50	0.978	354.2	0.986	357.1
56	3/6/2002	8:25 AM	RC	R1	338	0.1	0.1	0.5	34	1	0.89	50	0.978	328.9	0.986	331.5
57	3/6/2002	8:07 AM	RC	R1.5	252	0.1	0.1	0.5	70	1	0.89	50	0.978	256.4	0.986	258.5
58	4/16/2002	9:15 AM	CH	R1	316	0.1	0.1	0.5	63	1	2.8	50	0.978	310.6	0.986	313.2
59	4/16/2002	9:00 AM	CH	R1.5	248	0.1	0.1	0.5	70	1	2.8	50	0.978	253.0	0.986	255.0
60	5/7/2002	9:45 AM	JB	R1	319	0.1	0.1	0.5	66	1	2.8	50	0.978	313.1	0.986	315.7
61	5/7/2002	9:30 AM	JB	R1.5	228	0.1	0.1	0.5	63	1	2.8	50	0.978	235.6	0.986	237.5
62	5/7/2002	9:45 AM	JB	R1	319	0.1	0.1	0.5	32	1	2.8	50	0.978	313.1	0.986	315.7
63	5/7/2002	11:48 AM	JB	R2	235	0.1	0.1	0.5	91	1	2.8	50	0.978	241.7	0.986	243.7
64	5/7/2002	11:29 AM	JB	R5	226	0.1	0.1	0.5	88	1	2.8	50	0.978	233.8	0.986	235.7
65	6/6/2002	9:35 AM	JB	R1	358	0.1	0.1	0.5	90	1	2.8	50	0.978	345.3	0.986	348.1
66	6/6/2002	9:15 AM	JB	R1.5	216	0.1	0.1	0.5	68	1	2.8	50	0.978	225.0	0.986	226.9
67	7/2/2002	9:00 AM	JB	R1	203	0.1	0.1	0.5	57	1	2.8	50	0.978	213.5	0.986	215.2
68	7/2/2002	8:35 AM	JB	R1.5	354	0.1	0.1	0.5	92	1	2.8	50	0.978	342.0	0.986	344.8
69	8/6/2002	9:50 AM	SA	R1	327	0.1	0.1	0.5	66.2	1	0.79	4	0.978	319.8	0.986	322.4
70	8/6/2002	8:35 AM	SA	R2	230	0.1	0.1	0.5	91.4	1	0.79	4	0.978	237.3	0.986	239.3
71	8/6/2002	8:15 AM	SA	R5	246	0.1	0.1	0.5	85.4	1	0.79	4	0.978	251.2	0.986	253.3
72	8/7/2002	9:45 AM	SA	R1	387	0.1	0.1	0.5	59	1	2.8	50	0.978	368.8	0.986	371.8
73	8/7/2002	8:30 AM	SA	R1.5	230	0.1	0.1	0.5	120	1	2.8	50	0.978	237.3	0.986	239.3
74	9/10/2002	9:30 AM	SA	R1	347	0.1	0.1	0.5	31.4	1	0.65	5	0.978	336.3	0.986	339.0
75	9/10/2002	9:10 AM	SA	R1.5	221	0.1	0.1	0.5	54.7	1	0.65	5	0.978	229.4	0.986	231.3
76	10/8/2002	9:20 AM	SA	R1	272	0.1	0.1	0.5	43.4	1	0.65	5	0.978	273.6	0.986	275.8
77	10/8/2002	9:00 AM	SA	R1.5	223	0.1	0.1	0.5	57.4	1	0.65	5	0.978	231.2	0.986	233.1
78	11/5/2002	10:20 AM	SA	R1	273	0.1	0.1	0.5	79.6	1	0.79	4	0.978	274.4	0.986	276.7
79	11/5/2002	9:05 AM	SA	R2	201	0.1	0.1	0.5	93.1	1	0.79	4	0.978	211.7	0.986	213.4
80	11/5/2002	8:40 AM	SA	R5	198	0.1	0.1	0.5	116	1	0.79	4	0.978	209.0	0.986	210.7
81	11/6/2002	9:50 AM	SA	R1	306	0.1	0.1	0.5	31.6	1	0.65	5	0.978	302.3	0.986	304.8
82	11/6/2002	9:10 AM	SA	R1.5	207	0.1	0.1	0.5	44.5	1	0.65	5	0.978	217.1	0.986	218.8
83	12/3/2002	10:30 AM	SA	R1	340	0.1	0.1	0.5	27.2	1	0.65	5	0.978	330.5	0.986	333.2
84	12/3/2002	9:55 AM	SA	R1.5	230	0.1	0.1	0.5	60.8	1	0.65	5	0.978	237.3	0.986	239.3
85	2/4/2003	9:40 AM	JC	R1	310	0.1	0.1	0.5	31.3	1	0.79	4	0.978	305.6	0.986	308.1
86	2/4/2003	8:40 AM	JC	R2	220	0.1	0.1	0.5	51.9	1	0.79	4	0.978	228.6	0.986	230.4
87	2/4/2003	8:25 AM	JC	R5	210	0.1	0.1	0.5	4.4	1	0.79	4	0.978	219.7	0.986	221.5
88	5/6/2003	2:45 PM	PG	R1	307	0.1	0.1	0.5	46.9	1	1.09	5.5	0.978	303.1	0.986	305.6
89	5/6/2003	12:15 PM	PG	R2	222	0.1	0.1	0.5	64	1	1.09	5.5	0.978	230.3	0.986	232.2
90	5/6/2003	1:45 PM	PG	R5	222	0.1	0.1	0.5	92.7	1	1.09	5.5	0.978	230.3	0.986	232.2
91	8/5/2003	10:30 AM	JC	R1	326	0.1	0.1	0.5	68.4	1	1.09	5.5	0.978	318.9	0.986	321.5
92	8/5/2003	11:30 AM	JC	R2	185	0.1	0.1	0.5	133	1	1.09	5.5	0.978	197.3	0.986	199.0

R1:Burbank Western Wash (BWW) Lockheed Channel confluence, 50 ft above BWRP
R1.5:About 50 ft upstream of Burbank Power Plant 001 discharge
R2:BWW @Verdugo
R5:BWW upstream of LA River confluence

Hardness and Zinc in the Burbank Western Channel

Entity Providing Information:
City of Burbank
Contact Person: Rodney Andersen
275 E. Olive Ave.
Burbank, CA, 91510
randersen@ci.burbank.ca.us

NPDES PERMIT NO. CA0055531, ORDER NO 96-050 (JUNE 1996 TO JUNE 1998):
METALS MONITORING REQUIRED SEMI-ANNUALLY, HARDNESS NOT REQUIRED.
NPDES PERMIT, ORDER 98-072 (JUNE 1998 TO PRESENT):
METALS AND HARDNESS REQUIRED QUARTERLY

					Hardness				Zinc				* Comparison with CTR Water Quality Objectives			
#	Date	Time	Sampler	Station	Actual Result (mg/L as CaC03)	ML (mg/L)	MDL (mg/L)	RDL (mg/L)	Actual Result (ug/L)	ML (ug/L)	MDL (ug/L)	RDL (ug/L)	CF_{acute}	CMC (ug/L)	$CF_{chronic}$	CCC (ug/L)
93	8/5/2003	11:15 AM	JC	R5	190	0.1	0.1	0.5	159	1	1.09	5.5	0.978	201.9	0.986	203.5
94	11/6/2003	10:20 AM	JJ	R1	246	0.1	0.1	0.5	37.4	1	1.09	5.5	0.978	251.2	0.986	253.3
95	11/6/2003	11:05 AM	JJ	R2	199	0.1	0.1	0.5	169	1	1.09	5.5	0.978	209.9	0.986	211.6
96	11/6/2003	11:15 AM	JJ	R5	199	0.1	0.1	0.5	72.7	1	1.09	5.5	0.978	209.9	0.986	211.6
97	2/10/2004	9:00 AM	JC	R1	352	0.1	1	5	50.4	1	1.09	5.5	0.978	340.4	0.986	343.1
98	2/10/2004	9:30 AM	JC	R2	226	0.1	1	5	108	1	1.09	5.5	0.978	233.8	0.986	235.7
99	2/10/2004	10:00 AM	JC	R5	229	0.1	1	5	87.2	1	1.09	5.5	0.978	236.5	0.986	238.4
100	3/30/2004	9:45 AM	JJ	R1	208	0.1	1	5	38.8	1	0.75	3.7	0.978	217.9	0.986	219.7
101	3/30/2004	9:00 AM	JJ	R2	191	0.1	1	5	63.1	1	0.75	3.7	0.978	202.8	0.986	204.4
102	3/30/2004	8:45 AM	JJ	R5	192	0.1	1	5	110	1	0.75	3.7	0.978	203.7	0.986	205.3
103	5/4/2004	9:15 AM	JJ	R1	301	0.1	1	5	187	1	0.75	3.7	0.978	298.1	0.986	300.5
104	5/4/2004	9:30 AM	JC	R2	187	0.1	1	5	95.9	1	0.75	3.7	0.978	199.2	0.986	200.8
105	5/4/2004	9:00 AM	JC	R5	196	0.1	1	5	90.4	1	0.75	3.7	0.978	207.2	0.986	208.9
106	8/4/2004	9:30 AM	JC	R1	321	0.1	1	5	43.4	1	0.75	3.7	0.978	314.8	0.986	317.4
107	8/4/2004	9:50 AM	JJ	R2	205	0.1	1	5	89.7	1	0.75	3.7	0.978	215.3	0.986	217.0
108	8/4/2004	9:20 AM	JJ	R5	219	0.1	1	5	96.6	1	0.75	3.7	0.978	227.7	0.986	229.5
109	11/2/2004	10:20 AM	CV	R1	358	0.1	1	5	22	1	0.75	3.7	0.978	345.3	0.986	348.1
110	11/2/2004	9:25 AM	CV	R2	230	0.1	1	5	75.2	1	0.75	3.7	0.978	237.3	0.986	239.3
111	11/2/2004	9:00 AM	PG	R5	227	0.1	1	5	82.7	1	0.75	3.7	0.978	234.7	0.986	236.6
112	2/15/2005	10:00 AM	JJ	R1	177	0.1	1	5	20.1	1	0.75	3.7	0.978	190.1	0.986	191.6
113	2/15/2005	9:00 AM	JC	R2	165	0.1	1	5	76.3	1	0.75	3.7	0.978	179.1	0.986	180.6
114	2/15/2005	8:36 AM	JC	R5	200	0.1	1	5	83.6	1	0.75	3.7	0.978	210.8	0.986	212.5
115	5/12/2005	8:30 AM	JC	R1	259	0.1	1	5	22.6	1	0.35	1.8	0.978	262.4	0.986	264.6
116	5/12/2005	9:00 AM	JC	R2	227	0.1	1	5	66	1	0.35	1.8	0.978	234.7	0.986	236.6
117	5/12/2005	9:15 AM	JC	R5	233	0.1	1	5	70.1	1	0.35	1.8	0.978	239.9	0.986	241.9
118	8/9/2005	8:45 AM	JC	R1	297	0.1	1	5	25.8	1	0.35	1.8	0.978	294.7	0.986	297.1
119	8/9/2005	8:25 AM	JJ	R2	198	0.1	1	5	79.8	1	0.35	1.8	0.978	209.0	0.986	210.7
120	8/9/2005	8:00 AM	JJ	R5	223	0.1	1	5	74.6	1	0.35	1.8	0.978	231.2	0.986	233.1
121	11/1/2005	9:30 AM	JC/KS	R1	305	0.1	1	5	14.7	1	0.35	1.8	0.978	301.4	0.986	303.9
122	11/1/2005	9:00 AM	JC	R2	217	0.1	1	5	73.7	1	0.35	1.8	0.978	225.9	0.986	227.8
123	11/1/2005	8:40 AM	JC	R5	208	0.1	1	5	77.9	1	0.35	1.8	0.978	217.9	0.986	219.7

*** The highest hardness value to be used in criteria calculation is 400 mg/L.*

R1:Burbank Western Wash (BWW) Lockheed Channel confluence, 50 ft above BWRP
R1.5:About 50 ft upstream of Burbank Power Plant 001 discharge
R2:BWW @Verdugo
R5:BWW upstream of LA River confluence

UNITED WATER
BURBANK WATER RECLAMATION PLANT

Standard Operating Procedure for the
Burbank Water Reclamation Plant

STANDARD OPERATING PROCEDURE FOR
Receiving Water Monitoring, Burbank Western Channel

United Water Services, Inc.

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1.0 Introduction

The purpose of this Standard Operating Procedure (SOP) is to define the procedure for monitoring the receiving water stations of the Burbank Water Reclamation Plant. An old axiom states "...the result of any analytical method can be no better than the sample on which it is performed." When any sample is collected, preserved, or stored, it is important that specific guidelines are in place to maintain the sample's integrity and analytical results. The primary focus of this SOP is to ensure that all required samples needed to meet the BWRP sampling program are sampled and handled correctly to avoid any possible contamination or deterioration of the sample before reaching the laboratory for analysis.

2.0 Major Activities Associated with Receiving Water Monitoring.

A list of major activities associated with Receiving Water Monitoring is as follows:

- Sample container(s) preparation
- Field sampling and analysis
- Visual observations of receiving waters
- Documentation / Record keeping

3.0 Receiving Water Stations

A list of Receiving Water Stations associated with Receiving Water Monitoring is as follows:

Receiving water (RW) stations have been established at the following locations:

Monitoring Station Number	Monitoring Station Location
R1	At the confluence of the Burbank Western Wash and the Lockheed Channel about 300 feet above the Reclamation Plant
R2	Burbank Western Wash at Verdugo Avenue
R5	Burbank Western Wash just upstream from the Los Angeles River confluence at Riverside Drive

Stations R-2 and R-5 are located at channel overpasses and are monitored from above by collecting samples via a rope and sample container. Samples are collected at station R-1 by entering the Burbank Western Channel by lowering and securing an extension ladder and descending to the channel floor.

4.0 Performance Standards Associated with Receiving Water Monitoring

Performance Standards associated with Receiving Water Monitoring are as follows:

- All required personal protective equipment worn
- Proper calibration of monitoring equipment
- Accurate sampling and field analysis
- Accurate completion of River Log documentation
- Accurate completion of Sample Chain of Custody documentation

5.0 Safety Considerations

Some sample constituents can be toxic, therefore precautions must be taken during sample collection and handling. The following personal protective equipment (PPE) will be worn at all times while collecting samples at stations R-1, R-2 and R-5:

- Minimum required personal protective equipment is a hard hat, safety glasses and hand protection
- Exercise proper personal hygiene
- Ensure the proper PPE's are worn when working with raw river water
- Exercise extreme caution when working in the Western Wash

Station R-1 is sampled by descending 18 feet into the Burbank Western Channel and collecting samples directly from the channel flow. Special precautions must be taken when entering and exiting the Channel at station R-1. In addition to other listed PPE, fall protection must be employed that consists of a full-body, MSA pullover harness (model 502734) and polyester safety line, or equivalent.

A vehicle inspection will be conducted before beginning any activity requiring use of a company vehicle. The Health and Safety Form HSF-032 will be used to document the inspection, after which it will be filed in the vehicle inspection record binder located at the administration desk (Appendix C).

6.0 Seasonal or other variations

This Standard Operating Procedure has the following seasonal or other variations:

- Entry into the Western Wash when there is an imminent threat of rain is strictly forbidden and considered an unsafe act due to the varying weather conditions upstream of receiving water sampling points.
- Receiving water samples shall not be taken during or within 48 hours following the flow of rainwater runoff into the Los Angeles River System.

7.0 Safety Equipment

Safety Equipment associated with Receiving Water Monitoring is as follows:

- Personal protective equipment
    1. Hard hat
    2. Safety Glasses
    3. Hand protection
- Fall arrest system
    1. MSA Full-body harness
    2. Polyester safety line

The pullover, full body, harness (model 502734) is the primary component of the personal fall arrest system and meets all applicable OSHA standards. The harness and safety rope are primarily used for protection during ladder climbing. Other uses consist of rescue, retrieval or evacuation. The harness is designed to contain and distribute the forces of fall arrest, restraint and suspension to the wearer's pelvis, thighs, chest and shoulders. For more information see Appendix A, MSA Pullover Harness User Instructions. Before using the MSA pullover harness each user will be trained by an individual knowledgeable in the proper dawning, use, removal of the harness and use of the safety rope. Acceptable trainers include: The Laboratory Manager and Operations personnel trained in confined space entry.

8.0 Required Sampling Equipment

Laboratory personnel performing receiving water sampling and monitoring must possess the following equipment:

- Sterile sample containers: for coliforms samples only
- Non-sterile sample containers with caps (plastic or TFE-lines as appropriate); glass bottles (standard or borosilicate), plastic bottles (polyethylene or equivalent), acid washed plastic or glass containers, with appropriate preservative, if necessary
- Hach sensION156 digital multimeter: pH, D.O., and Electrical Conductivity
- A Thermometer; digital or glass, units in °C or °F.
- Plastic coolers or similar containers for transport of collected samples.
- Chain of custody forms
- Laboratory logbook
- pH test strips

9.0 Reagents

The following chemical reagents are used in receiving water sampling and monitoring:

- ***Sulfuric Acid, reagent grade:*** preserve ammonia, organic nitrogen, total phosphate and total organic carbon samples (adjust pH to <2).
- ***Nitric Acid, ICP/MS grade:*** preserve metals samples (adjust pH to <2).
- ***Hydrochloric Acid, Reagent grade:*** Used to preserve samples for O&G and volatile organic compound analysis (adjust pH to <2).
- ***Sodium Hydroxide, 50%:*** Used to preserve cyanide samples (adjust pH to >10).
- ***Aluminum Chloride***: Used to preserve samples for dissolved or total sulfide analysis.
- ***10% Sodium Thiosulfate***: Dechlorinate samples for organic analysis [5 drops (≈0.25 ml) ≈80 mg/L]

10.0 Sample Collection and Preservation Procedures

Depending on the analysis to be performed, sample collection procedures may vary. Refer to Standard Methods, Table 1060:I – Summary of Special Sampling or Handling Requirements for specific details.

Sample to ensure analytical results represent the sample's composition. Factors that may affect results include: suspended matter, turbidity, physical and chemical changes that come with storage and/or aeration.

Receiving water samples are collected as ***Grab or Catch*** *samples* only. Grab samples only represent the sample source's composition at a particular time.

A 1 Liter sample size is collected for most analyses. Refer to Table 1060-I for guidance on sample bottle preparation. Sample bottle preparation is to be performed by trained laboratory personnel only.

Handle samples appropriately so they do not deteriorate or become contaminated before reaching the lab.

Keep a record of every sample collected (see Chain of Custody Procedures section 11.0 of this SOP) and identify every bottle by attaching a label. Record pertinent information on each bottle to provide positive sample identification at a later date, including the sample name, location, sampler's initials, time of sampling, name of preservative (if applicable) and laboratory identification number.

TABLE 1060:I. SUMMARY OF SPECIAL SAMPLING OR HANDLING REQUIREMENTS*

Determination	Container†	Minimum Sample Size mL	Sample Type‡	Preservation§	Maximum Storage Recommended/ Regulatory‖
Acidity	P, G(B)	100	g	Refrigerate	24 h/14 d
Alkalinity	P, G	200	g	Refrigerate	24 h/14 d
BOD	P, G	1000	g	Refrigerate	6 h/48 h
Boron	P	100	g, c	None required	28 d/6 months
Bromide	P, G	100	g, c	None required	28 d/28 d
Carbon, organic, total	G	100	g, c	Analyze immediately; or refrigerate and add H_3PO_4 or H_2SO_4 to pH<2	7 d/28 d
Carbon dioxide	P, G	100	g	Analyze immediately	stat/N.S.
COD	P, G	100	g, c	Analyze as soon as possible, or add H_2SO_4 to pH<2; refrigerate	7 d/28 d
Chloride	P, G	50	g, c	None required	28 d
Chlorine, residual	P, G	500	g	Analyze immediately	0.5 h/stat
Chlorine dioxide	P, G	500	g	Analyze immediately	0.5 h/N.S.
Chlorophyll	P, G	500	g, c	30 d in dark	30 d/N.S.
Color	P, G	500	g, c	Refrigerate	48 h/48 h
Conductivity	P, G	500	g, c	Refrigerate	28 d/28 d
Cyanide:					
Total	P, G	500	g, c	Add NaOH to pH>12, refrigerate in dark#	24 h/14 d; 24 h if sulfide present
Amenable to chlorination	P, G	500	g, c	Add 100 mg $Na_2S_2O_3$/L	stat/14 d; 24 h if sulfide present
Fluoride	P	300	g, c	None required	28 d/28 d
Hardness	P, G	100	g, c	Add HNO_3 to pH<2	6 months/6 months
Iodine	P, G	500	g, c	Analyze immediately	0.5 h/N.S.
Metals, general	P(A), G(A)	500	g	For dissolved metals filter immediately, add HNO_3 to pH<2	6 months/6 months
Chromium VI	P(A), G(A)	300	g	Refrigerate	24 h/24 h
Copper by colorimetry*					
Mercury	P(A), G(A)	500	g, c	Add HNO_3 to pH<2, 4°C, refrigerate	28 d/28 d
Nitrogen:					
Ammonia	P, G	500	g, c	Analyze as soon as possible or add H_2SO_4 to pH<2, refrigerate	7 d/28 d
Nitrate	P, G	100	g, c	Analyze as soon as possible or refrigerate	48 h/48 h (28 d for chlorinated samples)
Nitrate + nitrite	P, G	200	g, c	Add H_2SO_4 to pH<2, refrigerate	none/28 d
Nitrite	P, G	100	g, c	Analyze as soon as possible or refrigerate	none/48 h
Organic, Kjeldahl*	P, G	500	g, c	Refrigerate; add H_2SO_4 to pH<2	7 d/28 d
Odor	G	500	g	Analyze as soon as possible; refrigerate	6 h/N.S.
Oil and grease	G, wide-mouth calibrated	1000	g, c	Add HCl to pH<2, refrigerate	28 d/28 d
Organic compounds:					
MBAS	P, G	250	g, c	Refrigerate	48 h
Pesticides*	G(S), TFE-lined cap	1000	g, c	Refrigerate; add 1000 mg ascorbic acid/L if residual chlorine present	7 d/7 d until extraction; 40 d after extraction
Phenols	P, G	500	g, c	Refrigerate, add H_2SO_4 to pH<2	*/28 d
Purgeables* by purge and trap	G, TFE-lined cap	2 × 40	g	Refrigerate; add HCl to pH <2; add 1000 mg ascorbic acid/L if residual chlorine present	7 d/14 d
Oxygen, dissolved:	G, BOD bottle	300	g		
Electrode				Analyze immediately	0.5 h/stat
Winkler				Titration may be delayed after acidification	8 h/8 h
Ozone	G	1000	g	Analyze immediately	0.5 h/N.S.
pH	P, G	50	g	Analyze immediately	2 h/stat
Phosphate	G(A)	100	g	For dissolved phosphate filter immediately; refrigerate	48 h/N.S.
Salinity	G, wax seal	240	g	Analyze immediately or use wax seal	6 months/N.S.
Silica	P	200	g, c	Refrigerate, do not freeze	28 d/28 d
Sludge digester gas	G, gas bottle	—	g	—	N.S.
Solids	P, G	200	g, c	Refrigerate	7 d/2–7 d; see cited reference
Sulfate	P, G	100	g, c	Refrigerate	28 d/28 d
Sulfide	P, G	100	g, c	Refrigerate; add 4 drops 2*N* zinc acetate/100 mL; add NaOH to pH>9	28 d/7 d
Taste	G	500	g	Analyze as soon as possible; refrigerate	24 h/N.S.
Temperature	P, G	—	g	Analyze immediately	stat/stat
Turbidity	P, G	100	g, c	Analyze same day; store in dark up to 24 h, refrigerate	24 h/48 h

* See text for additional details. For determinations not listed, use glass or plastic containers; preferably refrigerate during storage and analyze as soon as possible.

† P = plastic (polyethylene or equivalent); G = glass; G(A) or P(A) = rinsed with 1 + 1 HNO_3; G(B) = glass, borosilicate; G(S) = glass, rinsed with organic solvent or baked.

‡ g = grab; c = composite.

§ Refrigerate = storage at 4°C, in the dark.

‖ Environmental Protection Agency, Rules and Regulations. 40 CFR Parts 100–149, July 1, 1992. See this citation for possible differences regarding container and preservation requirements. N.S. = not stated in cited reference; stat = no storage allowed; analyze immediately.

If sample is chlorinated, see text for pretreatment.

10.1 R1 Receiving water sampling and analysis

Location **R1**

Task #1 Set-up sampling safety equipment

Steps:
1. Unlock two gates that lead to the R1 sample site
2. Unlock & untie ladder, lower into the Western Wash and resecure to railing. (Two person job)
3. Properly fit safety harness to lab personnel and attach the nylon safety line
4. One analyst descend ladder to collect samples from receiving water stream

Task #2 Receiving Water Sampling and Analysis

Steps:
1. Rinse bottle two or three times with the water being collected before filling.
2. Analysis depending, fill the container full or leave space for aeration/mixing. Except when sampling volatile organic compounds, leave an airspace equivalent to 1% container volume. This allows the sample to expand or contract depending on the environmental conditions.
3. Perform visual observations
4. Secure ladder and safety harness
5. Perform field analysis of samples taken

10.2 R2 Receiving water sampling and analysis

Location **R2**

Task #1 Receiving Water Sampling and Analysis

Steps:
1. Lower sampling device into the Receiving water and retrieve sample.
2. Rinse sample bottle(s) two or three times with the water being collected before filling.
3. Analysis depending, fill the container full or leave space for aeration/mixing. Except when sampling volatile organic compounds, leave an airspace equivalent to 1% container volume. This allows the sample to expand or contract depending on the environmental conditions.
4. Perform visual observations
5. Perform field analysis of samples taken

10.3 R5 Receiving water sampling and analysis

Location **R5**
Task #1 Receiving Water Sampling and Analysis

Steps:
1. Lower sampling device into the Receiving water and retrieve sample.
2. Rinse sample bottle(s) two or three times with the water being collected before filling.
3. Analysis depending, fill the container full or leave space for aeration/mixing. Except when sampling volatile organic compounds, leave an airspace equivalent to 1% container volume. This allows the sample to expand or contract depending on the environmental conditions.
4. Perform visual observations
5. Perform field analysis of samples taken.

NOTE: **(1)** If a preservative is present, take special care not to overfill the container, as preservative may be lost or diluted. Do not rinse if the bottle contains a dechlorination agent or preservative.
(2) For samples that contain residual chlorine, fill the sample container about ¾ full then add 1 drop (≈0.05 ml) of 10% sodium Thiosulfate solution.

11.0 Visual Observations

In addition to the individual sampling and analytical requirements of each receiving water location visual observations are also made at the time the receiving waters are sampled in at least one area between R-1 and R-2, and in the vicinity of R-5. All observations are to be documented in the Observation log with attention given to the presence and extent, or absence of:

- oil, grease, scum, or solids of waste origin
- sludge deposits
- discoloration
- algal blooms
- odors
- foam
- any usual occurrences

Additional observation data to be recorded in the observation log is as follows:

- Date and time of observation
- Weather conditions
- Flow measurement
- Exact sampling location
- Users of water in the river (i.e. homeless, people washing in the river, etc.)
- Non-contact users (i.e.: bikers, joggers, etc.)
- Wildlife (i.e.: birds, mammals, reptiles, estimated amount of vegetation)

12.0 Field Sample Analyses

Field Sample analyses associated with Receiving Water monitoring includes the following:

1. **pH:** The pH of wastes discharged shall at all times be within the range of 6.0 to 9.0.

2. **Temperature:** The temperature of wastes discharged shall not exceed 100°F.

3. **Dissolved Oxygen:** The dissolved oxygen in the receiving water shall not be depressed below 5 mg/L as a result of wastewater discharge.

4. **Chlorine Residual:** The residual chlorine in the receiving water shall not exceed 0.1mg/L as a result of the wastes discharged.

5. **Flow (estimate):** $= \frac{Y \times B \times V}{1.545}$

Where Y = Channel Depth (ft)
B = ½ Wetted Channel Width (ft)
V = Velocity (ft/sec)

13.0 Chain of Custody Procedures:

The ability to trace sample possession and handling from the collection time through analysis and final disposition is essential to insuring sample integrity. This process is referred to as chain of custody (COC) and is important in demonstrating sample control when litigation is involved. The COC procedure is useful

for tracking samples and analyses, regardless if litigation is not a consideration. The following are summaries of the major aspects of the "chain of custody":

a) **Sample Labels**

Labels are important because they prevent sample misidentification. Self-adhesive labels are generally used. Information written on the labels should include sample identification, collection date and time, sampler's initials, sampling site, and preservative (if applicable). Labels are affixed to the container prior to sampling. Use a waterproof pen or marker to write sample information.

b) **Sample Seals**

Sample seals are used to detect unauthorized tampering up until the sample prep or analysis has occurred. Self-adhesive paper seals are acceptable for this requirement. Attach the seal in such a way that it is necessary to break the seal to open the container. The person who performs the sampling is responsible to affix the seal correctly before it leaves his or her jurisdiction.

c) **Chain of Custody (COC), Logbook or Observation Sheet**

Record all pertinent sampling information on COCs and log and observation sheet including the sample location, collection date and time, sample type (grab or composite), condition (physical characteristics), sampling reason (permit or process analysis), requested analysis, preservative (if used), field observations, laboratory i.d. number, date and time sample received and signature of sampler and sample receipt custodian. (Log and observation worksheet, See Appendix B).

d) **Sample Transport and Delivery**

Chill samples on ice immediately after collection and deliver to the sample receiving laboratory in a timely fashion, usually within 1 hours of collection.

e) **Sample Receipt and Log-in**

Relinquish samples to authorized personnel only. Once delivered, laboratory personnel inspect the sample bottle's condition and make sure the seal is in place and all information on the label and COC record is complete and correct. A laboratory number is assigned and pertinent information entered into the sample logbook and LIMS.

14.0 Laboratory Analysts Sample Assignments

It is the laboratory manager's responsibility to ensure the proper training and cross training of all lab personnel. Laboratory personnel must receive adequate training on each analysis before performing any analysis on the Receiving Water Samples.

Laboratory analysts performing field sampling and analysis are responsible for distribution of the collected samples to be analyzed in the laboratory. Samples are distributed to laboratory analysts according to their training and levels of expertise. Analysts are responsible for the sample while it is in their custody.

15.0 Minimum Sampling / Analysis Frequency and Limitations

The Burbank Water Reclamation Plant NPDES permit section V Receiving Water Monitoring Requirements (Pages T-6 thru T-9) details the Receiving Water sampling locations, constituents to be monitored and their minimum analysis frequency.

16.0 Receiving Water Monitoring Program

The following analyses, which constitute the receiving water monitoring program, shall be conducted on grab samples obtained at Stations R-1, R-2 and R-5 at the indicated frequency:

Constituent	Analysis Frequency	Constituent	Analysis Frequency
pH	weekly	Chronic Toxicity	quarterly
Dissolved Oxygen	weekly	Acute Toxicity	quarterly
Total Coliform	weekly	Arsenic	quarterly
Temperature	weekly	Cadmium	quarterly
Total Residual Chlorine	weekly	Total Chromium	quarterly
Turbidity	quarterly	Copper	quarterly
Total Dissolved Solids	quarterly	Lead	quarterly
Conductivity	quarterly	Mercury	quarterly
Chloride	quarterly	Nickel	quarterly
Sulfate	quarterly	Zinc	quarterly
Nitrate nitrogen	quarterly	Total Hardness	quarterly
Nitrite Nitrogen	quarterly	Cyanide	quarterly
Ammonia nitrogen	quarterly	Phenolic Compounds	semi-annually
Organic Nitrogen	quarterly	Aldrin	semi-annually
Total Nitrogen	quarterly	Dieldrin	semi-annually
Total Phosphate (as P)	quarterly	Endrin	semi-annually
Detergents (as MBAS)	quarterly	HCH	semi-annually
BOD_5 20°C	quarterly	Chlordane	semi-annually
Total Organic Carbon	quarterly	Lindane	semi-annually
Oil and Grease	quarterly	Toxaphene	semi-annually
MTBE	quarterly	PAHs	semi-annually

Only stations R-1 and R-2 will be used to determine compliance with receiving water limits. Receiving water samples will not be taken during or within 48 hours following the flow of rainwater runoff into the Los Angeles River system. In addition, no sampling or observations need to be performed during periods where the plant is not discharging to the Burbank Western Channel.

Due to an inability to continuously monitor residual chlorine at R-2, an additional sampling station was created at the Burbank Western Channel's Olive Street overpass. The station is named R-Olive and is used to monitor the effectiveness of excess Sodium Bisulfite, from the Burbank Steam Power Plant's 001 discharge, on eliminating residual chlorine in the channel due to upstream contributions.

17.0 References

Standard Methods for the Examination of Water and Wastewater, 18th Edition, p 1-18, Method 1060A, B and C