Attachment B

Dilution/Mixing Zone Study Report Addendum

ECO:LOGIC
ENGINEERS · CONSULTANTS

3875 Atherton Road
Rocklin, CA 95765
916.773.8100 TEL
916.773.8448 FAX

January 12, 2009

Mr. James Marshall, P.E.
California Regional Water Quality Control Board
Central Valley Region
11020 Sun Center Drive #200
Ranch Cordova, CA 95670

RE: Addendum to San Andreas Sanitary District Dilution/Mixing Zone Study Evaluation

Dear Mr. Marshall:

The purpose of this letter is to provide additional information regarding the San Andreas Sanitary District (District) Dilution/Mixing Zone Study, specifically to define the edge of the mixing zone in the North Fork Calaveras River and to describe how mixing zone conditions specified in Section 1.4.2.2 of The Policy for Implementation of Toxics Standards for Inland Surface Water, Enclosed Bays, and Estuaries of California (SIP) are satisfied.

The District initially provided a Dilution/Mixing Zone Study Report to the Water Board on 11 June 2004. Subsequently, in response to a Water Board staff request, the District submitted a Study Report evaluation which included the use of the USGS mixing model equation and the data from the original Study Report. The Study Report evaluation provided evidence that complete mixing (i.e., 95% mixed per USGS) of simulated effluent with North Fork Calaveras River water at or about 20 feet downstream of the diffuser, which is well within two stream widths (i.e., approximately 120 feet for this 60-foot wide reach of the river) downstream of the diffuser as specified in SIP. The Study Report evaluation identified the downstream side of the concrete ford, located approximately 20 feet downstream of the diffuser, as the proposed edge of the mixing zone. More information regarding the identification of the edge of the mixing zone is provided below.

Overview

The District has recently completed the construction of an effluent pipeline and a 48 foot long cross-stream diffuser for the discharge of effluent to the North Fork Calaveras River. The construction project included rebuilding an existing concrete ford that crossed the river just downstream of the diffuser and upstream of the confluence of Murry Creek and North Fork Calaveras River. The San Andreas Sanitary District Dilution/Mixing Zone Study was conducted on a flat section of the old concrete ford to simulate conditions on the new ford was designed to be level to act as a broad-crested weir to provide control of river/effluent mixing over a wide range of river flows.

Mixing Calculations

The Study Report evaluation presented all of the temperature corrected fluorescence (TCF) data in Table 1 of the Study Report evaluation. However, percentage mixing calculations, using USGS methods (presented in Table 2 of the Study Report evaluation), were only provided for the furthest downstream Study transect (transect 8), which provided a percentage mixing result of 95%. Transect 8 was located near the downstream edge of the concrete ford. To better define the edge of the mixing zone, a summary of percentage mixing results (calculated using USGS methods) for transects four though eight are presented in Table 1 below. These results were calculated using the same methodology and data as in the Study Report evaluation.

Table 1
SASD Dilution/ Mixing Zone Study Percentage Mixing Summary

Transect	Mixing
4	93%
5	94%
6	94%
7	95%
8	95%

The information presented in Table 1 above indicates that complete mixing (i.e., 95% or greater) was not observed at transects upstream of transects 4 through 6. However, minimum requirement for complete mixing is observed at transects 7 and 8, just upstream of the downstream edge of the concrete ford.

Edge of Mixing Zone

As indicated above, complete mixing takes place just upstream of the downstream edge of the concrete ford. Because of the variability in field conditions and equipment sensitivity limitations it is appropriate to apply a safety factor when determining the edge of the mixing zone. Therefore, a safety factor of approximately 20% has been applied to the identified edge of the mixing zone. The application of the safety factor essentially moves the defined edge of the mixing zone from just upstream of the downstream edge of the newly constructed concrete ford (transect 7), to the downstream edge of the newly re-constructed concrete ford (approximately 20 to 22 feet downstream of the diffuser). Because the river is approximately 60 feet wide at the concrete ford, the identified mixing zone is significantly smaller than the minimum requirement of two stream widths (or 120 feet) as specified in SIP.

Because of the unique configuration of the District's discharge to the North Fork Calaveras River (i.e., located adjacent to a concrete ford which does not support resident aquatic life), the

identified/proposed mixing zone is appropriate for the protection against both acute and chronic aquatic life toxic conditions.

Confirmation of Mixing Using Supplemental Field Measurements

The North Fork Calaveras River diffuser is now complete and in use. The District has conducted a field study using basic field measurable parameters to gather information regarding the percentage mixing of secondary treated effluent with North Fork Calaveras River receiving water. A summary of the study and preliminary results is provided below.

- Study dates: 1/1/09, 1/2/09, 1/7/09, 1/8/09, 1/9/09
- North Fork Calaveras River width: approximately 48'
- North Fork Calaveras River depth at the ford: approximately 4"
- Effluent dilution ratio: approximately 27:1 to 28:1
- Location of field measurements: 1) upstream of diffuser and 2) approximately 11 feet downstream of diffuser (i.e., about half way into the proposed mixing zone for safety reasons) where USGS mixing would be estimated to be about 93% based on the 2004 study results presented in Table 1 (see transect 4).
- Field measurements collected (using hand-held meters): temperature, pH, DO, EC, TDS

Field measurements were collected approximately eleven feet (middle of the concrete ford) downstream of the diffuser at ten locations along the ford on five different days. Results from the most stable of the field parameter measured, Total Dissolved Solids (TDS), from the five day study were entered into the USGS formulas to determine percentage mixing. A summary of the calculated percentage mixing results are provided in Table 2 below.

Table 2
SASA Field Measurement Study Percentage Mixing Summary

Date	Mixing
1/1/09	95%
1/2/09	93%
1/7/09	91%
1/8/09	92%
1/9/09	94%
Average	93%

The average mixing determined using TDS data is 93%. The results from this field study appear to be consistent with results obtained using data from the original Dilution/Mixing Zone Study. The results support that effluent is not completely mixed with North Fork Calaveras River receiving water at a location in the middle of the concrete ford downstream of the diffuser. It is worth noting that during this study, field personnel consistently had to contest with cattle in the area, crossing the river on and off the ford. Although field personnel collected the most representative water quality measurement data possible give the site conditions, it is possible that deposits into the river from the cattle, combined with any disturbance of river bottom sediment, could have impacted the study data. Therefore, the results from this field study should be considered as approximate values that are presented only as additional information in support of data collected during the original study.

SIP Required Conditions

SIP, in Section 1.4.2.2, contains mixing zone conditions that must be met to allow a mixing zone. The requirement that "A mixing zone shall be as small as practicable" has been demonstrated in the Edge of Mixing Zone section of this letter. The following SIP requirements and explanations of how these requirements are met are provided as numbered items below.

1. A mixing zone shall not compromise the integrity of the entire water body.

   The identified mixing zone is located entirely on a concrete ford, which does not support resident aquatic life. Therefore the integrity of the water body downstream of the effluent discharge point will not be compromised. Furthermore, visual observations during periods of effluent discharge to North Fork Calaveras River have provided no evidence of compromising the integrity of the water body.

2. A mixing zone shall not cause acutely toxic conditions to aquatic life passing through the mixing zone.

   The entire mixing zone is comprised of a uniform concrete ford approximately 20 feet wide, which is free of resident aquatic life, bordered by a plunge pool on the downstream side. This small mixing zone configuration, combined with a discharge rate of 1 part effluent to 19 parts receiving water (secondary effluent) and 1 part effluent to 9 parts receiving water (tertiary effluent), is not expected to cause acutely toxic conditions to aquatic life passing over the concrete ford.

3. A mixing zone shall not restrict the passage of aquatic life.

   There are no obstructions that will limit the passage of aquatic life. Effluent is discharged through a multi-port diffuser located within a rock filled concrete box set into and level with the upstream edge of the ford. Because effluent is discharged from the bottom of the ford, and up, a zone of passage for aquatic life is present through the mixing zone near the surface

of the river. Because the concrete ford does not provide good habitat for higher life aquatic organisms (because of ford traffic and the surface being exposed flat concrete), these organisms are likely to avoid the ford or pass through the mixing zone quickly.

4. A mixing zone shall not adversely impact biologically sensitive or critical habitats, including, but not limited to, habitat of species listed under federal or State endangered species laws.

   No biologically sensitive or critical habitats are located within the mixing zone, which is a concrete ford. Therefore no biologically sensitive or critical habitats will be adversely impacted within the mixing zone.

5. A mixing zone shall not produce undesirable or nuisance aquatic life.

   Because the mixing zone consists of a concrete ford, which does not support aquatic life, no undesirable or nuisance aquatic life production is expected.

6. A mixing zone shall not result in floating debris, oil, or scum.

   Documented historical secondary treated effluent water quality data, combined with the configuration of the discharge location and visual observations, indicate that floating debris, oil, and scum will not result from the identified mixing zone.

7. A mixing zone shall not produce objectionable color, odor, taste, or turbidity.

   Documented historical secondary treated effluent water quality data, combined with the configuration of the discharge location and visual observations, indicate that the mixing zone will not produce objectionable color, odor, taste, or turbidity.

8. A mixing zone shall not cause objectionable bottom deposits.

   Documented historical secondary treated effluent water quality data, combined observations of the discharge location support that no objectionable bottom deposits are caused in the mixing zone.

9. A mixing zone shall not cause nuisance.

   No nuisance or potential for nuisance have been observed within the identified mixing zone.

10. A mixing zone shall not dominate the receiving water body or overlap a mixing zone from different outfalls.

    The mixing zone is small relative to the surrounding river. Therefore, the mixing zone does not dominate the receiving water body. Furthermore, there are no other outfalls within the vicinity of the discharge point that would result in an overlap of mixing zones.

11. A mixing zone shall not be allowed at or near any drinking water intake.

    There is no drinking water intake in the vicinity of the outfall.

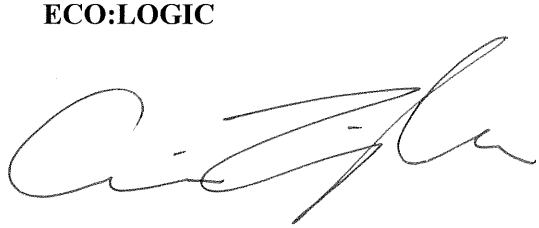
Summary

- The smallest possible mixing zone in the North Fork Calaveras River is identified as the downstream edge of the concrete ford, which crosses the river just downstream of the District's multi-port diffuser outfall. The boundary of the mixing zone (edge of concrete ford) is estimated to be approximately 20 feet downstream of the outfall.
- Because of the difficulty of sampling shallow water without intaking surface films and/or disturbing biofilms, the sampling point of compliance for this mixing zone needs to be in the plunge pool immediately downstream of the concrete ford where there is adequate water depth to collect a representative, undisturbed water sample.
- The proposed mixing zone should be allowed, and appropriate dilution credits applied (D=19 for secondary effluent, D=0 for tertiary effluent) because all of the conditions in Section 1.4.2.2 of the SIP are satisfied and all North Fork Calaveras River beneficial uses are protected.

Please contact me if you have questions or require additional information regarding the subject of this letter.

Sincerely,

ECO:LOGIC



Eric Zeigler
Water Quality Scientist

cc: Steve Shimp, SASD General Manager

Attachment C

Bis(2-ethylhexyl)phthalate Lab Report

Marine
Laboratories, Inc.
"A Center for Excellence in Analytical Chemistry and Environmental Microbiology"

January 30, 2008

ECO:LOGIC Engineering
3875 Atherton Road
Rocklin, CA 95765

Re: CRG Marine Laboratories — Project ID: P ELE001
ECO:LOGIC Engineering — Project ID: CTR Event #2

ATTN: Eric Zeigler

CRG Laboratories is pleased to provide you with the enclosed analytical data report for your CTR Event #2 project. According to the chain-of-custody, 2 samples were received intact at CRG on 1/4/2008. Per your instructions, the samples were analyzed for:

- Base/Neutral Extractable Compounds By GCMS Using Method EPA 625m

Please don't hesitate to call if you have any questions and thank you very much for using our laboratory for your analytical needs.

Regards,
Claire Waggoner

Reviewed and Approved Claire Waggoner

2020 Del Amo Blvd., Suite 200, Torrance, CA 90501-1206 (310) 533-5190 FAX (310) 533-5003 crglabs@sbcglobal.net

Project Sample List

ECO:LOGIC Engineering
CRG Project ID: **ELE001**
Project Officer: Eric Zeigler
Project Description: CTR Event #2

CRG Sample ID#	*Client Sample ID*	*Sample Description*	*Date Sampled*	*Matrix*
61923	SASD Effluent		02-Jan-08	Freshwater
61924	North Fork Calaveras River		02-Jan-08	Freshwater

CRG's QUALITY ASSURANCE PROGRAM SUMMARY

BATCH: CRG's Quality Assurance Program Document defines a batch as a group of 20 or fewer samples of similar matrix, processed together under the same conditions and with the same reagents. Quality control samples are associated with each batch and are used to assess the validity of the sample analyses. CRG typically uses batch sizes of 10-15 samples.

PROCEDURAL BLANKS: Laboratory contamination was controlled through the analysis of procedural blanks on a minimum frequency of 1 per batch. CRG's Quality Assurance Program Document requires that all procedural blanks be below 10 times the MDL and all detectable constituents in the blanks be flagged in the sample results. The Procedural Blanks are presented in the Procedural Blank section of this report.

ACCURACY: Accuracy of the project data was indicated by analysis of matrix spikes, surrogate spikes, certified reference materials, positive controls, and/or laboratory control materials on a minimum frequency of 1 per batch. CRG's Quality Assurance Program Document requires that 95% of the target compounds greater than 10 times the MDL be within the specified acceptance limits. The Acceptance Ranges are presented in the Accuracy Data section of this report.

PRECISION: Precision of the project data was determined by analysis of duplicate matrix spikes, blank spikes, and/or duplicate test sample analysis on a minimum frequency of 1 per batch. CRG's Quality Assurance Program Document requires that for 95% of the compounds >10 times the MDL, the % Relative Percent Difference (%RPD) should be within the specified acceptance range. The %RPD for the duplicate test sample analysis can be significantly affected by the homogeneity of the sample matrix within the sample container itself causing additional variability in the analytical results. In these cases, the QA/QC Acceptance Limits may be exceeded. The %RPD and Acceptance Ranges are presented in the Precision Data section of this report.

GLOSSARY OF TERMS

Qualifier	Definition
B	Analyte was detected in the associated method blank.
E	Analyte concentration exceeds the calibration range
H	Sample received and/or analyzed past the recommended holding time.
J	Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.
M1	Recovery of the Matrix Spike or Matrix Spike Duplicate compound was out of control due to matrix interference.
M2	The MS/MSD RPD was out of control due to matrix interference.
M3	Detection of the analyte was difficult due to matrix interference.
M4	Spike or surrogate compound recovery was out of control due to matrix interference. The associated method blank spike or surrogate compound was in control and therefore the sample data was reported without further clarification.
ND or U	Parameter not detected at the indicated reporting limit.
NES	Not enough sample.
Q1	Spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration.
Q2	The sample RPD was out of control. Sample is heterogeneous and sample homogeneity could not be readily achieved using routine laboratory practices.
Q3	RPD values are not accurate and not applicable because the results for R1 and/or R2 are lower than 10 times the MDL.
R	Analyte was removed by the sample preparation/extraction procedure as seen by the MS/MSD recoveries. RPD acceptance ranges do not apply.

DATA REPORT

CRG Marine Laboratories, Inc.

2020 Del Amo Blvd., Suite 200, Torrance, CA 90501-1206 (310) 533-5190 FAX (310) 533-5003 crglabs@sbcglobal.net

Base/Neutral Extractable Compounds

ANALYTICAL REPORT

Analyte	Fraction	Result	MDL	RL	Units	Batch	Prepared	Analyzed	Method	QA Code
61923-R1 SASD Effluent						**Freshwater**	**Sampled: 02-Jan-08**		**Received: 04-Jan-08**	
bis(2-Ethylhexyl) Phthalate	Total	11650.4	100	125	ng/L	ELE001-34029	1/4/2008	1/15/2008	EPA 625m	
Butylbenzyl Phthalate	Total	418.5	25	50	ng/L	ELE001-34029	1/4/2008	1/15/2008	EPA 625m	
Diethyl Phthalate	Total	319.6	100	125	ng/L	ELE001-34029	1/4/2008	1/15/2008	EPA 625m	
Dimethyl Phthalate	Total	ND	50	75	ng/L	ELE001-34029	1/4/2008	1/15/2008	EPA 625m	
Di-n-butyl Phthalate	Total	173.2	75	100	ng/L	ELE001-34029	1/4/2008	1/15/2008	EPA 625m	
Di-n-octyl Phthalate	Total	248	10	20	ng/L	ELE001-34029	1/4/2008	1/15/2008	EPA 625m	
61924-R1 North Fork Calaveras River						**Freshwater**	**Sampled: 02-Jan-08**		**Received: 04-Jan-08**	
bis(2-Ethylhexyl) Phthalate	Total	ND	100	125	ng/L	ELE001-34029	1/4/2008	1/15/2008	EPA 625m	
Butylbenzyl Phthalate	Total	ND	25	50	ng/L	ELE001-34029	1/4/2008	1/15/2008	EPA 625m	
Diethyl Phthalate	Total	ND	100	125	ng/L	ELE001-34029	1/4/2008	1/15/2008	EPA 625m	
Dimethyl Phthalate	Total	ND	50	75	ng/L	ELE001-34029	1/4/2008	1/15/2008	EPA 625m	
Di-n-butyl Phthalate	Total	ND	75	100	ng/L	ELE001-34029	1/4/2008	1/15/2008	EPA 625m	
Di-n-octyl Phthalate	Total	ND	10	20	ng/L	ELE001-34029	1/4/2008	1/15/2008	EPA 625m	

QUALITY CONTROL REPORT

CRG Marine Laboratories, Inc.

2020 Del Amo Blvd., Suite 200, Torrance, CA 90501-1206 (310) 533-5190 FAX (310) 533-5003 crglabs@sbcglobal.net

Base/Neutral Extractable Compounds

QUALITY CONTROL REPORT

Analyte	Fraction	Result	MDL	RL	Units	Spike Level	Source Result	% Recovery	Acceptance Limits	Limit Pass/Fail	RPD	RPD LIMIT	Limit Pass/Fail	QA Code
Batch ID: ELE001-34029		**QAQC**	**Procedural Blank**					**Prepared**	**1/4/2008**			**Analyzed**	**15-Jan-08**	
Lab Blank 61922-B1			**DI Water**											
bis(2-Ethylhexyl) Phthalate	Total	ND	100	125	ng/L									
Butylbenzyl Phthalate	Total	ND	25	50	ng/L									
Diethyl Phthalate	Total	ND	100	125	ng/L									
Dimethyl Phthalate	Total	ND	50	75	ng/L									
Di-n-butyl Phthalate	Total	ND	75	100	ng/L									
Di-n-octyl Phthalate	Total	ND	10	20	ng/L									
Batch ID: ELE001-34029		**QAQC**	**Procedural Blank**					**Prepared**	**1/4/2008**			**Analyzed**	**15-Jan-08**	
Blank Spike 61922-BS1			**DI Water**											
bis(2-Ethylhexyl) Phthalate	Total	247.9	100	125	ng/L	242.4	0	102	20 - 190%	PASS				
Butylbenzyl Phthalate	Total	242.2	25	50	ng/L	242.4	0	100	65 - 160%	PASS				
Diethyl Phthalate	Total	181.1	100	125	ng/L	242.4	0	75	50 - 150%	PASS				
Dimethyl Phthalate	Total	174.9	50	75	ng/L	242.4	0	72	40 - 155%	PASS				
Di-n-butyl Phthalate	Total	210.8	75	100	ng/L	242.4	0	87	65 - 145%	PASS				
Di-n-octyl Phthalate	Total	246.7	10	20	ng/L	242.4	0	102	50 - 165%	PASS				
Batch ID: ELE001-34029		**QAQC**	**Procedural Blank**					**Prepared**	**1/4/2008**			**Analyzed**	**15-Jan-08**	
Blank Spike Dup 61922-BS2			**DI Water**											
bis(2-Ethylhexyl) Phthalate	Total	246.9	100	125	ng/L	242.4	0	102	20 - 190%	PASS	0	30	PASS	
Butylbenzyl Phthalate	Total	235.7	25	50	ng/L	242.4	0	97	65 - 160%	PASS	3	30	PASS	
Diethyl Phthalate	Total	167.5	100	125	ng/L	242.4	0	69	50 - 150%	PASS	8	30	PASS	
Dimethyl Phthalate	Total	174.8	50	75	ng/L	242.4	0	72	40 - 155%	PASS	0	30	PASS	
Di-n-butyl Phthalate	Total	210.7	75	100	ng/L	242.4	0	87	65 - 145%	PASS	0	30	PASS	
Di-n-octyl Phthalate	Total	248.6	10	20	ng/L	242.4	0	103	50 - 165%	PASS	1	30	PASS	

CHAIN-OF-CUSTODY

CRG Marine Laboratories, Inc.

2020 Del Amo Blvd., Suite 200, Torrance, CA 90501-1206
PHONE (310) 533-5190 FAX (310) 533-5003

CHAIN-OF-CUSTODY RECORD

Client Name	Steve Schimp, San Andreas Sanitary District
Address	P.O. Box 1630 San Andreas, CA 95249
Sampled By	Eric Zeigler, ECO:LOGIC
Project Manager	Eric Zeigler, ECO:LOGIC
Phone	916-773-8100
FAX	916-773-8448
Email	zeigler@ecologic-eng.com
Project Name/Number	CTR Event #2
P.O. Number	

REQUESTED ANALYSIS

	Client Sample ID	Sample Date	Sample Time	Sample Matrix*	Container Quantity	Container Type	bis(2-ethylhexyl)phthalate Low Level
1	SASD Effluent	1/2/08	12:50	FW	2	Amber Liter	x
2	North Fork Calaveras River	1/2/08	10:30	FW	2	Amber Liter	x
3	~~South Fork Calaveras River~~			~~FW~~	~~2~~	~~Amber Liter~~	~~x~~
4							
5							
6							
7							
8							
9							
10							

Correct Containers:	Yes	No		
Sample Temperature:	Ambient	Cold	Warm	
Sample Preservative:	Yes	No		
Turnaround Time:	STD	Specify:		
Report Format:	pdf	EDD	hardcopy	

Comments:

~~Original~~ ORIGINAL report and invoice to Steve Schimp.
Copy of report to Eric Zeigler, ECO:LOGIC

CRG Project ID: ELE001 (lab use only)

CRG Sample ID: _____ (lab use only)

RELINQUISHED BY

Signature:	
Print:	ERIC ZEIGLER
Company:	ECO LOGIC
DATE:	1/3/08 **TIME:** 15:00

RECEIVED BY

Signature:	
Print:	Adam Idell
Company:	CRG
DATE:	01/04/08 **TIME:** 0900

***MATRIX CODES**: (**SED** = Sediment); (**TISS** = Tissue); (**SW** = Seawater, Saltwater); (**FW** = Freshwater); (**WW** = Wastewater); (**STRMW** = Stormwater)

CRG
Marine Laboratories, Inc.

CRG Project ID
ELE001

SAMPLE RECEIVING

San Andreas Sanitary District

CLIENT NAME Ecologic Engineering

DATE RECEIVED 01/04/08

COURIER INFORMATION

☐ CRG	☑ FEDEX	TRACKING NUMBER 7983 4394 3110
☐ OTHER*	☐ UPS	

TEMPERATURE	Chain-of-Custody	SAMPLE MATRIX
☑ BLUE ICE	☑ INCLUDED	☑ LIQUID
10 °C ☐ WET ICE	☑ SIGNED	☐ SOLID
☐ NO ICE	☐ NOT INCLUDED	☐ OTHER*

CONDITION OF SAMPLES UPON ARRIVAL

	YES	NO*	NA
All sample containers intact and good condition	☑	☐	☐
All samples listed on COC are present	☑	☐	☐
Sample ID on containers consistent with COC	☑	☐	☐
Correct containers used for analyses requested	☑	☐	☐
All samples received within method holding time	☑	☐	☐

*NOTES

COMPLETED BY:

2020 Del Amo Boulevard Suite 200, Torrance, CA 90501 · (310) 533-5190 · FAX (310) 533-5003