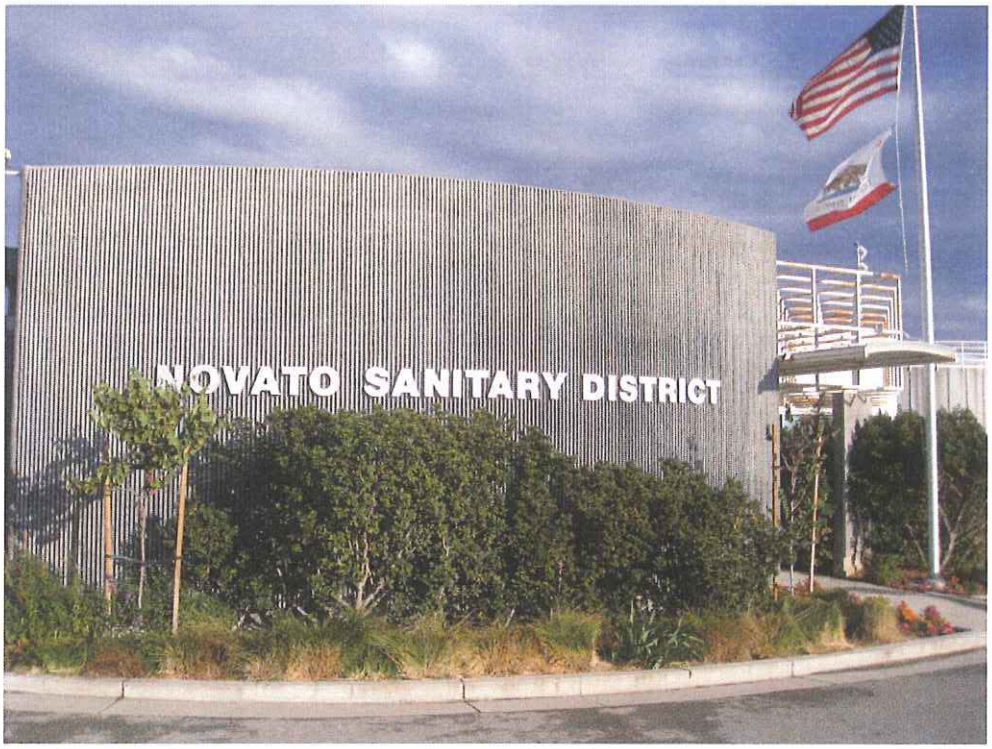
MARCH 2012

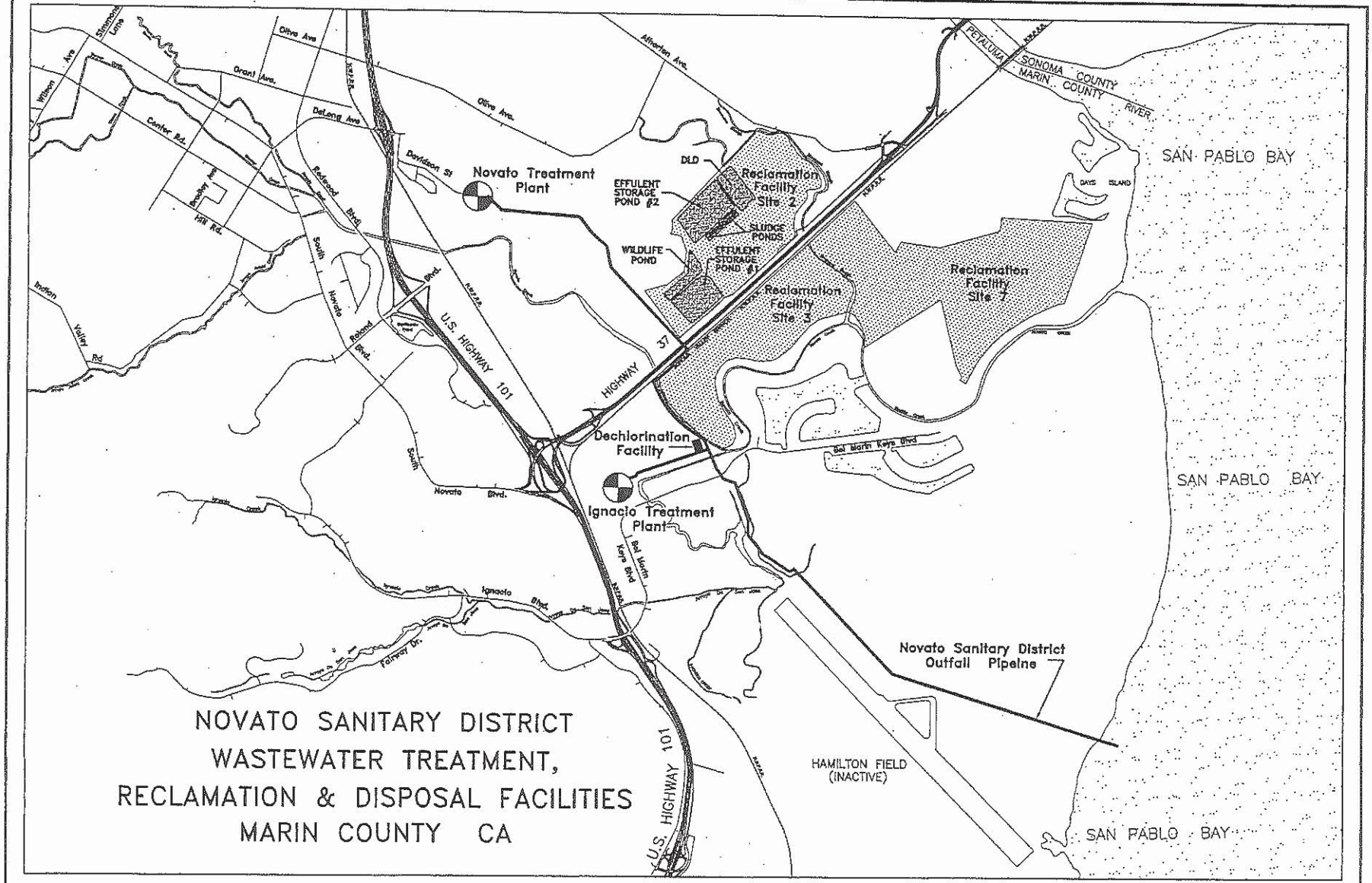
NOVATO SANITARY DISTRICT
VEOLIA WATER WEST OPERATING SERVICES

SELF MONITORING REPORT

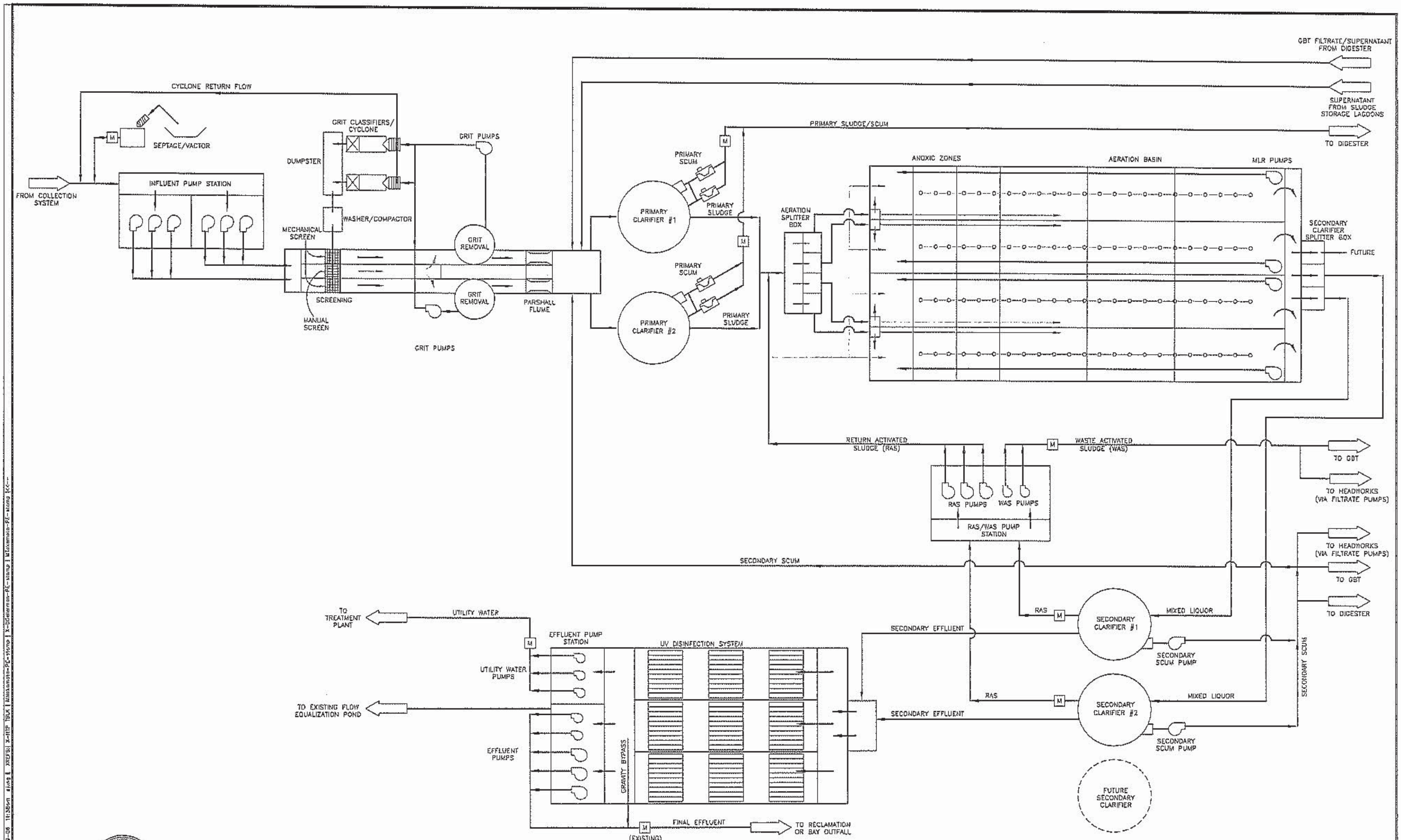
SECTION III

ATTACHMENTS





NOVATO SANITARY DISTRICT
WASTEWATER TREATMENT,
RECLAMATION & DISPOSAL FACILITIES
MARIN COUNTY CA



DESIGNED	M. TOLCHER	SUBMITTED: DENNIS GELLERMAN, RMC PROJ ENGR	CE-30847
DRAWN	S. JUNG	APPROVED: STEVE CLARY, RMC ENGR	CE-30338
CHECKED	M. MATSON		

VERIFY SCALES — BAR IS ONE INCH LONG ON FULL SIZE DRAWING. IF NOT ONE INCH LONG ON THIS DRAWING, ADJUST SCALES ACCORDINGLY

RMC Water & Environment

REV | DATE | BY | APVD | DESCRIPTION

NOVATO SANITARY DISTRICT

NOVATO WASTEWATER FACILITY UPGRADE

LIQUID PROCESS DIAGRAM

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SHEET NO	
PROJ NO	0049-007
DATE	December 2006

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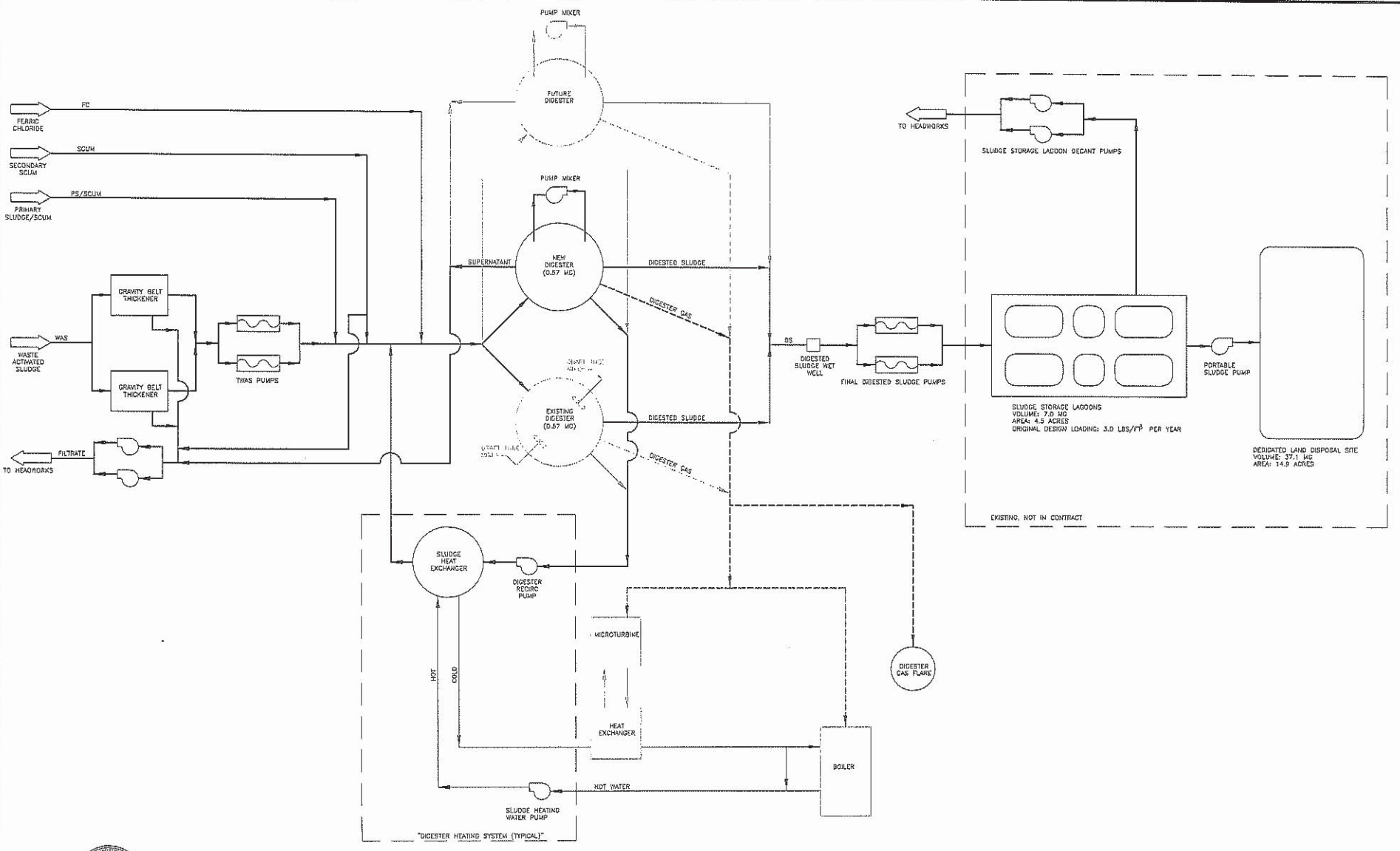

DESIGNED	M. TAKEMOTO	SUBMITTED:	DENNIS GELLERMAN RMC PROJ ENGR	DATE
DRAWN	S. HING	APPROVED:	STEVE CLARY RMC ENGR	DATE
CHECKED	M. MATSON			

RMC Water & Environment

NOVATO SANITARY DISTRICT

NOVATO WASTEWATER FACILITY UPGRADE

SOLIDS HANDLING DIAGRAM

DWG NO G-5
SHEET NO
PROJ NO 6040-607
DATE December 2006

REV	DATE	BY	APVD	DESCRIPTION

"VERIFY SCALE" BAR IS ONE INCH LONG ON FULL SIZE DRAWING. IF NOT ONE INCH LONG ON THIS DRAWING, ADJUST SCALES ACCORDINGLY

Last Saved By: mtakemoto 12-13-06 03:38pm

AQUA SCIENCE

ENVIRONMENTAL TOXICOLOGY SPECIALISTS

ACUTE FATHEAD MINNOW TOXICITY TEST WITH NOVATO SANITARY DISTRICT EFFLUENT

Submitted to:

Bob Adamson
Novato Sanitary District
500 Davidson Street
Novato, CA 94945

Submitted by:

AQUA-Science
630 Cantrill Drive
Davis, CA 95618
ELAP Certificate No. 2205
Expires: 1/31/2013

April 4, 2012

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ACUTE FATHEAD MINNOW TOXICITY TEST WITH NOVATO SANITARY DISTRICT EFFLUENT

1.0 EXECUTIVE SUMMARY

Novato Sanitary District final effluent (E-002) was tested using the acute *Pimephales promelas* (fathead minnow) toxicity flow-through test protocol. The 96-hour fathead minnow bioassay did not detect significant mortality when compared to the control. This test met all protocol and QA/QC requirements.

2.0 INTRODUCTION

AQUA-Science (Davis, CA) was retained by the Novato Sanitary District to perform a 96-hour acute flow-through fathead minnow (*Pimephales promelas*) survival toxicity test with final effluent E-002.

3.0 MATERIALS AND METHODS

3.1 Sample Collection and Transport

A 24-hour composite effluent sample was collected daily by Novato Sanitary District personnel in cubitainers and delivered on wet ice to AQUA-Science via courier. Appropriate chain-of-custody procedures were employed during collection and transport.

3.2 Sample Receipt

Water quality measurements including temperature, dissolved oxygen (DO), and pH were recorded on chain-of-custody form at sample receipt. Samples were stored in the dark at ≤4 °C until used for bioassays.

3.3 Water Quality Measurements

Temperature was continuously recorded in all bioassay test chambers with a Dickson pen recorder (Model ICT855, Addison, IL). DO (YSI Model 550A, Yellow Springs, OH), pH (Beckman 240, Fulton, CO), and temperature (calibrated digital thermometer; Central Co., Friendswood, TX) were measured in initial and 24-hour test solutions at change-out. Conductivity (WTW Model 330, Ft. Myers, FL), alkalinity (Hach Model AL-DT calorimetric test, Hach Co., Loveland, CO), and hardness (Hach HA-DT colorimetric test) were measured in the initial test solutions.

3.4 Fathead Minnow Toxicity Tests

The 96-hour acute flow-through fathead minnow bioassays were conducted in accordance with the U.S. Environmental Protection Agency (USEPA) 5th edition protocol[1]. Fathead minnows were obtained from Aquatox, Inc. (Hot Springs, AK), and were maintained in EPA moderately hard (EPAMH) water until tested at 7 days old. The effluent was tested using 2 replicates of 10 fish each in 400 mL plastic beakers containing 250 mL of test solutions. The effluent was continuously delivered to the test chambers using a 4-channel peristaltic pump at a flow rate of 5 mL/min, which provided a total of approximately 29 test chamber volumes per day. The effluent flow-rate was measured daily. Fish were fed *Artemia* nauplii daily. Tests were conducted at 25 ± 2 °C with a 16 hour light:8 hour dark photoperiod. Mortality was recorded daily.

3.5 Reference Toxicant Tests

A concurrent reference toxicant test was conducted with this species. Sodium chloride was the reference toxicant material used for the fathead minnows (control, 1.25, 2.5, 5, 7.5, and 10 g/L).

4.0 RESULTS

The acute fathead minnow flow-through toxicity test was initiated on 3/14/12 (Event 12-03). A summary of the test results and water quality parameters are presented in Tables 1 and 2, respectively. Statistical analyses were performed using CETIS™ v1.8.0.13 (Tidepool Scientific, McKinleyville, CA). A summary of the reference toxicant test results is presented in Table 3. All raw data is found in Appendix I.

Table 1. Summary of Acute Fathead Minnow Mortality

Test Sample	*Survival (%)*	*Survival (NOEC %)*	*PMSD (%)*[a]	*Comments*
Lab Control	90	100	n/a	No mortality was detected
E-002 (100%)	100	100	b	

a PMSD = percent minimum significant difference
b Value not calculated since there was 100% survival

Table 2. Summary of Water Quality Parameters

Parameter @ 100% Effluent	*Temp. (°C)*	*D.O. (mg/L)*	*pH*	*Alkalinity (mg/L)*	*Conductivity (mg/L)*	*Hardness (mg/L)*
Initial Value Range	25-26	7.6-8.0	7.72-7.86	120-165	558-716	140-175
24-hr Value Range	25-25	4.4-5.6	7.37-7.44	n/a	n/a	n/a

[1] Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms. Fifth Edition. October 2002. EPA 821-R-02-012.

Table 3. Summary of Reference Toxicant Results

Test Endpoint	*NOEC (g/L)*	*LOEC (g/L)*	*EC_{25} (g/L)*	*EC_{50} (g/L)*	*PMSD (%)*
Survival	7.5	10.0	8.0	8.6	n/a

The effluent (E-002) did not cause any mortality in the 96-hour acute flow-through fathead minnow aquatic bioassay. The reference toxicant test was within normal limits for this laboratory, and produced a Type 7 dose response (significant effect at the highest concentration only).

Approved by/Issue date: 4/4/12

Jeff Miller, Ph.D., DABT
President

AQUA SCIENCE

Environmental Toxicology Specialists

EFFLUENT TOXICITY TESTS FOR ASSESSING COMPLIANCE WITH NPDES CHRONIC TOXICITY LIMITS

NOVATO SANITARY DISTRICT WASTEWATER TREATMENT PLANT

SUBMITTED TO:

Bob Adamson
Novato Sanitary District
500 Davidson Street
Novato, CA 94945

SUBMITTED BY:

AQUA-Science
630 Cantrill Drive
Davis, CA 95618

April 4, 2012

EFFLUENT TOXICITY TESTS FOR ASSESSING COMPLIANCE WITH NOVATO SANITARY DISTRICT WASTEWATER TREATMENT PLANT NPDES CHRONIC TOXICITY LIMITS

1.0 CLIENT INFORMATION

Client:	**Novato Sanitary District**
Address:	500 Davidson Street Novato, CA 94945
Contact:	**Bob Adamson**
Phone/Fax:	(415) 892-1694 / (415) 898-2279

2.0 BIOTOXICITY TESTING REQUIREMENTS

Test Type:	**7-Day *Ceriodaphnia dubia* Chronic Survival and Reproduction Test**
Test Frequency:	**Quarterly**
Test Protocol:	**EPA 821-R-02-013**
Dilution Series:	**0, 6.25, 12.5, 25, 50, and 100% Effluent E-002**
	Antibiotic treatment (control & 100% effluent)
	Concurrent Reference Toxicant Series

3.0 CURRENT TEST INFORMATION

Event No.:	**First Quarter, 2012 (2012-03)**
Test Sample:	**Daily composite samples: 3/13-19/12**
Test Initiation:	**3/13/12**
Test Completion:	**3/19/12**

4.0 SUMMARY OF RESULTS

Based on the EC_{25}, the effluent produced significant reproductive effects in the chronic *Ceriodaphnia* toxicity test [45.5 TUc ($100/EC_{25}$)]. Antibiotic addition with the 100% effluent eliminated the toxicity in this test, indicating the toxicity was caused by bacteria. The concurrent reference toxicant test for this species was within the acceptable range, and all protocol and QA/QC requirements were met.

5.0 RESULTS OF INDIVIDUAL TESTS

5.1 *Effluent*

5.1.1 Current Effluent Test Data

Sample Concentration (%)	*% Survival*	*Reproduction (neonates/female)*	*QA/QC Requirements Met:*
Lab Control	100	27.0	• ≥80% survival in controls • average neonates/female in controls ≥15 • 60% of surviving control females produced at least three broods
12.5	100	14.4*	
25	80	14.2*	
50	70	13.4*	
75	100	15.9*	
100	70	19.4*	

* = significantly different than control ($p<0.05$)

5.1.2 Current Effluent Test Results

Test Endpoint[a]		*NOEC (%)*	*LOEC (%)*	*EC_{25} (%)*	*EC_{50} (%)*	*PMSD (%)*[b]
Survival	**% Effluent**	100	> 100	77.2	> 100	*c*
	TUc	1.0	n/a	**1.3**	< 1.0	
Reproduction	**% Effluent**	< 6.25	6.25	2.2	> 100	*30*
	TUc	> 16.0	n/a	**45.5**	< 1.0	

a Cetis™ v. 1.8.0.13 was used to calculate test endpoint

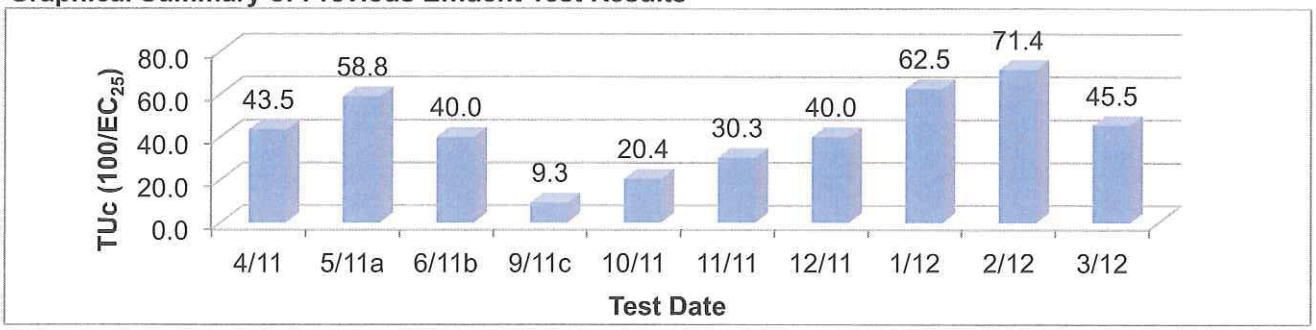
b PMSD = Percent Minimum Significant Difference

c Value could not be calculated due to statistical method used

5.1.3 Tabular Summary of Effluent Test Results (most sensitive endpoint - Section 5.1.2)

Test Date	*4/11*	*5/11a*	*6/11b*	*9/11c*	*10/11*	*11/11*	*12/11*	*1/12*	*2/12*	*3/12*
EC_{25} (%)	2.3	1.7	2.5	10.7	4.9	3.3	2.5	1.6	1.4	2.2
NOEC (%)	<6.25	< 6.25	< 25	6.3	12.5	< 6.25	< 6.25	< 6.25	< 6.25	< 6.25
TU ($100/EC_{25}$)	**43.5**	**58.8**	**40.0**	**9.3**	**20.4**	**30.3**	**40.0**	**62.5**	**71.4**	**45.5**

5.1.4 Graphical Summary of Previous Effluent Test Results



a TIE on composite of 4/18-24/11 samples; 5 replicates/concentration

b TIE - 5 replicates/concentration

c TIE - 10 replicates/concentration

5.1.5 Comments

Based on the EC_{25}, the effluent produced significant reproductive effects (45.5 TUc; $100/EC_{25}$), and produced a Type 8 dose response (significant effects at all test concentrations but flat dose-response curve).

5.2 *Reference Toxicant*

5.2.1 Current Reference Toxicant Test Results

Test Endpoint[a]	*NOEC (g/L)*	*LOEC (g/L)*	*EC_{25} (g/L)*	*EC_{50} (g/L)*	*PMSD (%)*[b]
Survival	2.0	4.0	2.3	2.8	*c*
Reproduction	0.25	0.50	0.4	**0.8**	*17*

a Cetis™ v. 1.8.0.13 was used to calculate test endpoint

b PMSD = percent minimum significant difference

c The PMSD could not be calculated due to the statistical method used

5.2.2 Comments

The reference toxicant test was within normal limits for this laboratory, and produced a Type 7 (significant effects only at the highest concentration) for the survival endpoint, and an ideal dose response for the reproduction endpoint. Appendix I shows the laboratory reference control chart for *C. dubia* reproduction.

5.3 *Antibiotic Treatment*

5.3.1 Individual Test Data

Sample Concentration (%)	*Antibiotics*	*% Survival*	*Reproduction (neonates/female)*
Antibiotic Control	Maracyn™ &	100	27.6
100	Maracyn™ Two	90	32.3

5.3.2 Comments

Antibiotic addition eliminated the effluent toxicity, indicating the effluent toxicity was caused by bacteria.

6.0 TESTING FACILITY

***AQUA*-Science**	California Department of Health Services ELAP
630 Cantrill Drive	Certification No. 2205 (1/31/13)
Davis, CA 95618	
(530) 753-5456	*File Reference:* *Novato (2012-03)*

Approved By/Issue Date: 4/4/12

Jeffrey L. Miller, Ph.D., DABT