# California Regional Water Quality Control Board
# San Diego Region

# SUPPLEMENTAL
# ERRATA

# to the

# March 21, 2011 PUBLIC RELEASE DRAFT

**of**

## WASTE DISCHARGE REQUIREMENTS FOR SEAWORLD PARKS & ENTERTAINMENT, INC. A DELAWARE CORPORATION, SEAWORLD LLC DBA SEAWORLD SAN DIEGO

**Tentative Order No. R9-2011-0032**
**NPDES NO. CA0107336**

***ERRATA AS OF***
***June 1, 2011***

This document represents tentative errata to the March 21, 2011, release of Tentative Order No. R9-2011-0032 as of June 1, 2011. The errata include changes made as a result of oral and written comments received on the March 21, 2011, public release of the Tentative Order.

## Permit Errata

### 1. Order, Cover Page

Table 3 will be modified as follows:

| | |
|---|---|
| This Order was adopted by the Regional Water Quality Control Board on: | ~~**May 11, 2011**~~ **June 8, 2011** |
| This Order shall become effective on: | ~~**June 30, 2011**~~ **July 28, 2011** |
| This Order shall expire on: | ~~**June 29, 2016**~~ **July 27, 2016** |
| The Discharger shall file a Report of Waste Discharge in accordance with title 23, California Code of Regulations, as application for issuance of new waste discharge requirements no later than: | **180 days prior to the Order expiration date** |

### 2. Order, Page 15

**a.** Discharge Point No. 001 (East Outfall) - The Discharger shall maintain compliance with the following effluent limitations at Discharge Point No. 001, with compliance measured at EFF-001, as described in the attached MRP.

**Table 6. Effluent Limitations for Discharge Point No. 001 (East Outfall)**

| Parameter | Units | Effluent Limitations | | | | |
|---|---|---|---|---|---|---|
| | | 6 Month Median | Average Monthly | Maximum Daily | Instantaneous Minimum | Instantaneous Maximum |
| Flow | MGD | -- | -- | 3.24 | -- | -- |
| pH | standard units | -- | -- | -- | 7.0 | 9.0 |
| Oil and Grease | mg/L | -- | 25 | -- | -- | 75 |
| | lbs/day[1] | -- | 676 | -- | -- | 2,026 |
| Turbidity | NTU | -- | 75 | -- | -- | 225 |
| Settleable Solids | ml/L | -- | 1.0 | -- | -- | 3.0 |
| Suspended Solids | mg/L | Narrative[2] | | | | |
| Ammonia | mg/L | -- | -- | -- | -- | 0.55 |
| | lbs/day[1] | -- | -- | -- | -- | 15 |
| Chlorine Residual | mg/L | -- | 0.21 | -- | -- | 0.42 |
| | lbs/day[1] | -- | 5.7 | -- | -- | 11.3 |
| Copper, Total Recoverable | µg/L | 24 | 38.13 | 76.5 | -- | -- |
| | lbs/day[1] | 0.65 | 1.0 | 2.1 | -- | -- |
| Silver, Total Recoverable | µg/L | 6.5 | 23.16 | 36 | -- | -- |
| | lbs/day[1] | 0.2 | 0.6 | 1.0 | -- | -- |
| Enterococcus | CFU/100 mL | -- | 35 | -- | -- | 104 |
| Fecal Coliform | MPN/100 mL | Narrative[3] | | | | |
| Total Coliform | MPN/100 mL | Narrative[4] | | | | |
| Chronic Toxicity | ~~TUc~~ | **Narrative[5]** | | | | |

[1] Mass-based effluent limitations calculated based on a maximum flow rate of 3.24 MGD.

[2] The concentration of suspended solids in the discharge of aquaria wastewater through Outfall No. 001 shall not be increased in excess of 10 mg/L as a monthly average or 15 mg/L as a daily maximum when compared to the suspended solids concentration in the intake water.

[3] The fecal coliform concentration based on a minimum of not less than five samples for any 30-day period, shall not exceed a log mean of 200/100mL, nor shall more than 10 percent of total samples during any 30-day period exceed 400/100mL.

[4] The median total coliform concentration throughout the water column for any 30-day period shall not exceed 70/100mL nor shall more than 10 percent of the samples collected during any 30-day period exceed 230/100 mL for a five-tube decimal dilution test or 330/100 mL when a three tube dilution test is used.

~~5 Discharger shall achieve a rating of "Pass" for chronic toxicity based on the procedures specified in Section V of the MRP.~~ **There shall be no chronic toxicity in the effluent discharge.**

**b.** Discharge Point No. 002 (West Outfall) - The Discharger shall maintain compliance with the following effluent limitations at Discharge Point No. 002, with compliance measured at EFF-002, as described in the attached MRP.

**Table 7. Effluent Limitations for Discharge Point No. 002 (West Outfall)**

| Parameter | Units | Effluent Limitations | | | | |
|---|---|---|---|---|---|---|
| | | 6 Month Median | Average Monthly | Maximum Daily | Instantaneous Minimum | Instantaneous Maximum |
| Flow | mgd | -- | -- | 6.12 | -- | -- |
| pH | standard units | -- | -- | -- | 7.0 | 9.0 |
| Oil and Grease | mg/L | -- | 25 | -- | -- | 75 |
| | lbs/day[1] | -- | 1,276 | -- | -- | 3,828 |
| Turbidity | NTU | -- | 75 | -- | -- | 225 |
| Settleable Solids | ml/L | -- | 1.0 | -- | -- | 3.0 |
| Suspended Solids | mg/L | Narrative[2] | | | | |
| Ammonia | mg/L | -- | -- | -- | -- | 0.55 |
| | lbs/day[1] | -- | -- | -- | -- | 28.1 |
| Chlorine Residual | mg/L | -- | 0.21 | -- | -- | 0.42 |
| | lbs/day[1] | -- | 10.7 | -- | -- | 21.4 |
| Copper, Total Recoverable | µg/L | 24 | 38.13 | 76.5 | -- | -- |
| | lbs/day[1] | 1.2 | 1.9 | 3.9 | -- | -- |
| Silver, Total Recoverable | µg/L | 6.5 | 23.16 | 36 | -- | -- |
| | lbs/day[1] | 0.33 | 1.2 | 1.8 | -- | -- |
| Enterococcus | CFU/100 mL | -- | 35 | -- | -- | 104 |
| Fecal Coliform | MPN/100 mL | Narrative[3] | | | | |
| Total Coliform | MPN/100 mL | Narrative[4] | | | | |
| Chronic Toxicity | ~~Pass/Fail~~ | **Narrative[5]** | | | | |

[1] Mass-based effluent limitations calculated based on a maximum flow rate of 6.12 MGD.

[2] The concentration of suspended solids in the discharge of aquaria wastewater through Outfall No. 001 shall not be increased in excess of 10 mg/L as a monthly average or 15 mg/L as a daily maximum when compared to the suspended solids concentration in the intake water.

[3] The fecal coliform concentration based on a minimum of not less than five samples for any 30-day period, shall not exceed a log mean of 200/100mL, nor shall more than 10 percent of total samples during any 30-day period exceed 400/100mL.

[4] The median total coliform concentration throughout the water column for any 30-day period shall not exceed 70/100mL nor shall more than 10 percent of the samples collected during any 30-day period exceed 230/100 mL for a five-tube decimal dilution test or 330/100 mL when a three tube dilution test is used.

5 ~~Discharger shall achieve a rating of "Pass" for chronic toxicity based on the procedures specified in Section V of the MRP.~~ **There shall be no chronic toxicity in the effluent discharge.**

**3. Order, Page 28**

**g.** This Order expires ~~June 29~~, **July 27**, 2016, after which, the terms and conditions of this permit are automatically continued pending issuance of a new Order, provided that all requirements of USEPA's NPDES regulations at 40 CFR 122.6 and the State's regulations at CCR Title 23, section 2235.4 regarding the continuation of expired Orders and waste discharge requirements are met.

**4. Order, Page 36**

**L. Chronic Toxicity**

~~For this discharge, the determination of "Pass" or "Fail" from a single-effluent concentration chronic toxicity test at the IWC of 100 percent effluent is determined using the Test of Significant Toxicity (TST) approach described in National Pollutant Discharge Elimination System Test of Significant Toxicity Implementation Document (EPA 833-R-10-003, 2010). For any one acute toxicity test, the chronic WET permit limit that must be met is rejection of the null hypothesis (Ho):~~

~~IWC (100 percent effluent) mean response ≤ 0.75 × Control mean response.~~

~~A test result that rejects this null hypothesis is reported as "Pass" on the DMR form. A test result that does not reject this null hypothesis is reported as "Fail" on the DMR form. To calculate either "Pass" or "Fail", the Discharger shall follow the instructions in National Pollutant Discharge Elimination System Test of Significant Toxicity Implementation Document, Appendix A. If a test result is reported as "Fail", then the Discharger shall follow Section 6 (Accelerated Toxicity Testing and TRE/TIE Process) of this permit.~~

~~The presence or absence of chronic toxicity shall be determined as specified in section V of the MRP.~~

**Compliance with this Order's narrative effluent limitation for chronic toxicity, contained in Section IV.A. Tables 6 and 7 of this**

**Order, shall be determined using:**

**1) the monitoring data generated in accordance with section V of Monitoring and Reporting Program No. R9-2010-0232; and**

**2) using a statistical method identified by the Discharger in a report submitted pursuant to Attachment E, Monitoring and Reporting Program, Section V.3 of this Order.**

**5. Attachment E, *Monitoring and Reporting Program*, Page E-6**

The Discharger shall conduct annual chronic toxicity testing on effluent samples collected at Effluent Monitoring Station EFF-001 and EFF-002 **to determine compliance with the Basin Plan's narrative water quality objective for toxicity. Toxicity monitoring shall be conducted** in accordance with the schedule and requirements in Table **E-3 above** ~~E-4~~:

~~Table E-4. Whole Effluent Toxicity Testing-EFF-001 and EFF-002~~

| ~~Parameter~~ | ~~Units~~ | ~~Sample Type~~ | ~~Minimum Sampling Frequency~~ |
|---|---|---|---|
| ~~Chronic Toxicity~~ | ~~Pass/Fail~~ | ~~24-hour composite~~ | ~~Annually~~ |

~~[1] Chronic toxicity results are due 180 days prior to the expiration date of the permit.~~

**6. Attachment E, *Monitoring and Reporting Program*, Page E-7**

~~3. Chronic WET Permit Limits~~
~~There is a chronic toxicity effluent limit for this discharge. The chronic WET permit limitation is any one toxicity test (either biological endpoint of survival or sublethal) where a test result is Fail (during the reporting period) at the chronic in-stream waste concentration (IWC). For this discharge, the IWC is 100 percent. To calculate either a Pass or Fail of the multiple-effluent concentration chronic toxicity test at the IWC, follow the instructions in Appendix A in the National Pollutant Discharge Elimination System Test of Significant Toxicity Implementation Document (EPA/833-R-10-003). A Pass result indicates no toxicity at the IWC, and a Fail result indicates toxicity at the IWC. The permittee must report either a Pass or a Fail on the DMR form. If a result is reported as Fail, the permittee must follow Section 7 (Reporting of Chronic Toxicity Monitoring Results) of this permit.~~

3. **Statistical Method for Chronic Toxicity Analysis**

**The Discharger shall submit a technical report to the San Diego Water Board by August 1, 2011 that identifies and evaluates the statistical method that will be used for analyzing whole effluent**

**toxicity data for compliance determinations with the narrative chronic toxicity effluent limitation contained in Section IV.A. Tables 6 and 7 of this Order. The statistical method may include Hypothesis Test Methods or Point Estimate Methods and shall be consistent with one of the following alternative statistical approaches:**

a. **The statistical approach described in U.S. Environmental Protection Agency, *National Pollutant Discharge Elimination System Test of Significant Toxicity (TST) Implementation Document*, (EPA 833-R-l 0-003), June 2010;**

b. **The statistical approaches described in U.S. Environmental Protection Agency Technical Support Documents (TSDs) for Water Quality-Based Toxics Control**

c. **A scientifically defensible statistical approach consistent with the State Water Resources Control Board, California Ocean Plan and the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California. The report shall include an analysis of the false positive and false negative error rates associated with the selected statistical method and supporting documentation demonstrating that the method can identify true toxicity in effluent toxicity data most of the time while also minimizing the probability that the effluent is declared toxic when in fact it is not.**

**The selected statistical method for analyzing effluent toxicity data shall be implemented subject to the approval of the San Diego Water Board.**

Additional information on the methods described above can be found in Section IV.C.5 of the Fact Sheet

7. **Attachment E, *Monitoring and Reporting Program*, Page E-7**

~~b. This permit is subject to a determination of Pass or Fail from a multiple-effluent concentration chronic toxicity test at the IWC (for statistical flowchart and procedures, see *National Pollutant Discharge Elimination System Test of Significant Toxicity Implementation Document*, Appendix A, Figure A-1). The chronic in-stream waste concentration (IWC) for this discharge is 100 percent (e.g., either is 100 percent or an effluent at the mixing zone to be determined) effluent.~~

**8. Attachment F, *Fact Sheet*, Page F-16**

The third sentence in the second paragraph of Section IV. will be modified as follows:

A dilution factor of 21:1 has been carried over from Order No. R9-2005-0091 for discharges from Discharge Point Nos. 001 and 002 for ~~chronic toxicity,~~ ammonia, chlorine residual, copper, silver, and calculation of performance goals for Ocean Plan Table B constituents.

**9. Attachment F, *Fact Sheet*, Page 31**

c. Ocean Plan - Beneficial uses of Mission Bay are similar to those of the ocean waters of the State. In order to protect the beneficial uses of Mission Bay, effluent limitations for oil and grease, turbidity, and settleable solids~~, and chronic toxicity~~ in this Order were derived from the Ocean Plan.

For each constituent requiring an effluent limit, identify the applicable water quality effluent concentration limitation contained in Table B of the Ocean Plan. Effluent limitations for water quality objectives listed in Table B, with the exception of acute toxicity and radioactivity, may be determined through the use of the following equation:

Ce = Co + Dm (Co-Cs)

Where

| | |
|---|---|
| Ce = | The effluent concentration limit |
| Co = | The concentration (water quality objective) to be met at the completion of initial dilution |
| Cs = | Background seawater concentration |
| Dm = | Minimum probable initial dilution expressed as parts seawater per part wastewater. |

~~For this Order, a dilution factor of 21:1 was used to calculate the effluent limitations established for chronic toxicity, total residual chlorine, copper, silver and ammonia. Effluent limitations in Order No. R9-2005-0091 were more stringent and were retained in this Order.~~

~~Further, no background concentration of chronic toxicity was established. Therefore for chronic toxicity the effluent limitation retained from Order No. R9-2005-0091 was calculated by the following equation:~~

~~Ce = 1 TUc + (21) (1 TUc- 0 TUc)~~

~~Thus, for chronic toxicity the applicable water quality criterion is:~~

~~Ce = 22 TUc~~

**10. Attachment F, *Fact Sheet*, Page 33**

**5. Whole Effluent Toxicity (WET)**

Whole effluent toxicity (WET) tests measure the aggregate toxic effect of a mixture of pollutants in the effluent. WET tests measure the degree of response of exposed aquatic test organisms to an effluent. The WET approach allows for protection of the narrative "no toxics in toxic amounts" criterion while implementing numeric criteria for toxicity. There are two types of WET tests: acute and chronic. An acute toxicity test is conducted over a short time period and measures mortality. A chronic toxicity test is conducted over a longer period of time and may measure mortality, reproduction, and development.

The Basin Plan specifies a narrative objective for toxicity, requiring that all waters be maintained free of toxic substances in concentrations that are lethal to or produce other detrimental responses by aquatic organisms. Detrimental response includes but is not limited to decreased growth rate, decreased reproductive success of resident or indicator species, and/or significant alterations in population, community ecology, or receiving water biota. The Basin Plan further dictates that compliance with the toxicity objective shall at a minimum be evaluated with a 96-hour acute bioassay and effluent limitations based upon acute bioassays of effluents be prescribed where appropriate.

~~On July 7, 2010, the State Water Board released a draft policy for whole effluent toxicity assessment and control (hereinafter, Toxicity Policy). In the draft Toxicity Policy, the State Water Board establishes water quality objectives for toxicity that apply to all inland surface waters, enclosed bays, and estuaries of the state, including both waters of the United States and surface waters of the state.~~

~~The Order, as recommended by the State Water Board in the draft Toxicity Policy, requires chronic toxicity monitoring and effluent limitations (where reasonable potential exists). Because chronic toxicity is considered to be a more conservative indicator of toxicity, and the monitoring of all wastewater sample locations for both acute and chronic toxicity would be costly and redundant, the monitoring requirements and effluent limitations for acute toxicity have been removed. It is assumed that by complying with effluent limitations for chronic toxicity, the Discharger will achieve water quality greater~~

~~than that necessary to achieve compliance with acute toxicity effluent limitations.~~

~~The implementation of toxicity monitoring requirements and effluent limitations as specified in the Order is based on a new statistical approach developed by USEPA that assesses the whole effluent toxicity measurement of wastewater effects on specific test organisms' ability to survive, grow, and reproduce called the Test of Significant Toxicity (TST). The new statistical approach is discussed in USEPA's June 2010 guidance document, National Pollutant Discharge Elimination System Test of Significant Toxicity Implementation Document, An Additional Whole Effluent Toxicity Statistical Approach for Analyzing Acute and Chronic Data, and National Pollutant Discharge Elimination System Test of Significant Toxicity Technical Document, An Additional Whole Effluent Toxicity Statistical Approach for Analyzing Acute and Chronic Date (EPA 833-R-10-003 and EPA 833-R-10-004).This new approach is a statistical method that uses hypothesis testing techniques based on research and peer-reviewed publications. The approach examines whether an effluent, at the critical concentration and a control within a whole effluent toxicity test differ by an unacceptable amount (the amount that would have a measured detrimental effect on the ability of aquatic organisms to thrive and survive).~~

~~Organism response to the effluent and control are unlikely to be exactly the same, even if no toxicity is present. They might differ by such a small amount that even if statistically significant, it would be considered negligible biologically. A more useful approach could be to rephrase the null hypothesis, "Is the mean response in the effluent less than a defined biological amount?" The Food and Drug Administration has successfully used that approach for many years to evaluate drugs, as have many researchers in other biological fields. In that approach, the null hypothesis is stated as the organism response in the effluent is less than or equal to a fixed fraction (b) of the control response (e.g., 0.80 of the control mean response):~~

~~Null hypothesis: Treatment mean ≤ b * Control mean~~

~~To reject the null hypothesis above means the effluent is considered non-toxic. To accept the null hypothesis means the effluent is toxic.~~

~~Before the TST null hypothesis expression could be recommended by USEPA, certain Regulatory Management Decisions (RMDs) were needed, including what effect level in the effluent is considered unacceptably toxic and the desired frequency of declaring a truly negligible effect within a test non-toxic.~~

In the TST approach, the b value in the null hypothesis represents the threshold for unacceptable toxicity. For chronic toxicity, the USEPA made the RMD that the b value is set at 0.75, which means that a 25 percent effect (or more) at the IWC is considered evidence of unacceptable chronic toxicity. For acute toxicity, the b value is set at 0.80.

USEPA's RMDs for the TST method are intended to identify unacceptable toxicity most of the time when it occurs, while also minimizing the probability that the in-stream waste concentration (IWC) is declared toxic when in fact it is truly acceptable. Additional RMDs by USEPA to achieve this objective were made regarding acceptable maximum false positive (β using a TST approach) and false negative rates (α using a TST approach).

In the TST approach, the RMDs are defined as:

1) Declare a sample toxic between 75 – 95 percent of the time ($0.05 \leq \alpha \leq 0.25$) when there is unacceptable toxicity.

2) Declare an effluent non-toxic no more than 5 percent of the time ($\beta \leq 0.05$) when the effluent effect at the critical effluent concentration is 10 percent.

USEPA used valid toxicity data from approximately 2,000 whole effluent toxicity tests to develop and evaluate the TST approach. The TST approach was tested using nine different whole effluent toxicity test methods comprising twelve biological endpoints and representing most of the different types of whole effluent toxicity test designs in use. More than one million computer simulations were used to select appropriate alpha error rates for each test method that also achieved USEPA's other RMDs for the TST approach.

The San Diego Water Board finds that the application of USEPA's TST method is scientifically defendable and appropriate for the determination of compliance with the Basin Plan's narrative objective for toxicity. As such, toxicity monitoring requirements, analysis, and effluent limitations have been implemented based on USEPA's TST method.

**Table F-14. Summary of Toxicity Limitations for Discharge Point Nos. 001 and 002**

| Parameter | Units | Effluent Limitations | | | | | Basis[1] |
|---|---|---|---|---|---|---|---|
| | | 6 Month Median | Average Monthly | Maximum Daily | Instantaneous Minimum | Instantaneous Maximum | |
| Chronic Toxicity | Pass/Fail | | | | | [2] | CO,OP |

~~[1] BP=Basin Plan, CO=Current Order, OP=Ocean Plan~~

~~[2] Discharges shall achieve a rating of "Pass" for chronic toxicity based on the procedures specified in section V of the MRP.~~

**The previous Order established effluent limitations for acute and chronic toxicity. Insufficient data were available to conduct a conclusive RPA for chronic toxicity (no recent chronic toxicity data was available during the permitting process). Without sufficient data to conduct an RPA pursuant to the procedures in Appendix VI of the Ocean Plan, and consistent with State and federal anti-backsliding requirements, an effluent limitation for chronic toxicity of at least the same stringency must be carried over to the renewed Order. Further, aquarium wastewater may contain toxic levels of ammonia if not properly treated and the Discharger has exceeded a previous effluent limitation for ammonia in November 2008; an RPA indicates that the toxic pollutants of copper and silver have been detected at concentrations greater than applicable water quality criteria, and the potential for synergistic effects of the various residual drugs and chemicals used for the maintenance of animal health and chemicals used for cleaning animal enclosures cannot be fully evaluated. Thus, an effluent limitation for chronic toxicity has been established in this Order.**

**Compliance with the Basin Plan's narrative water quality objective for toxicity shall be determined based on the statistical method identified by the Discharger in a report submitted to the San Diego Water Board. The report shall be submitted to the San Diego Water Board no later than August 1, 2011. Toxicity test compliance is determined by statistical methods that are expressed as biological measurements known as "endpoints." These endpoints are derived from various tests and techniques. The Discharger may consider statistical methods including but not limited to the following:**

**a Test of Significant Toxicity Method (TST). The TST was designed to statistically compare a test species response to the IWC and a control. Data is analyzed using Welch's t-test and quantal data is appropriately transformed prior to doing so. If the calculated t-value is less than the critical t-value (or table t-value), a sample is declared "toxic" and the test result is a "fail." A sample is deemed "not toxic" and the test result is a "pass" if the calculated t-value is greater than that of the critical t-value.**

**The biological effect levels (b values) incorporated into the TST define unacceptable risks to aquatic organisms and**

**substantially decrease the uncertainties associated with the applicability of results obtained from the NOEC and LOEC endpoints. Furthermore, the TST reduces the need for multiple test concentrations which, in turn, will reduce laboratory costs for dischargers while concurrently improving data interpretation. The most significant improvement the TST offers over that of traditional hypothesis testing, however, is the inclusion of an acceptable false negative rate. While calculating a range of percent minimum significant differences (PMSDs) provides an indirect measure of power for traditional hypothesis tests, setting an appropriate β level (or α level using the TST method) establishes explicit test power and provides motivation to decrease within-test variability which will significantly reduce the risk of unreported toxic events (U.S. EPA 2010a[2]). In addition to its benefits over traditional hypothesis test methods, the TST is simpler to use than point estimate methods as it is less computationally intensive and not model-fit dependent (Grothe et al. 1995[3]).**

**Taken together, these refinements simplify toxicity analyses, provide dischargers with the positive incentive to generate high quality data, and afford greater protection to aquatic life.**

**b Other Hypothesis Test Methods.**

**i. Pass/Fail**

**A multi-step pathway is used to identify chronic or acute toxicity in a single-concentration effluent test design. Analysis begins by transforming the raw data (expressed as the proportion unaffected) by the arcsine square root transformation. This calculation is commonly used on proportionality data to stabilize the variance and satisfy the normality requirement, which is typically completed with the Shapiro-Wilk test. If the data set does not meet the normality requirements, the non-parametric Wilcoxen Rank Sum Test can be used to analyze the data. If the data is normal, an F-test is performed to determine the homogeneity of variance. Should the data exhibit homogeneity, a normal t-test will be used for evaluation. If**

[2] U.S. Environmental Protection Agency. 2002a. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms (5th Edition). EPA 821-R-02-012. Washington, DC: Office of Water.
[3] Grothe DR, Dickson KL, Reed-Judkins DK. 1996. Whole Effluent Toxicity Testing: an Evaluation of Methods and Prediction of Receiving System Impacts. SETAC Pellston Workshop on Whole Effluent Toxicity; 1995 Sept 16-25; Pellston, MI. Pensacola FL: SETAC Pr.

**the data is not homogeneous, a modified t-test (where the pooled variance is adjusted for equal variance) is used (U.S. EPA 2002a).**

**ii. No Observable Adverse Effect Concentrations (NOAEC)**

**This method is used for multi-concentration acute toxicity tests with an equal number of replicates per treatment. The NOAEC endpoint is determined from Dunnett's test if the data is parametric, or Steel's Many-One Rank test if the data is non-parametric. Data is transformed to arcsine and then put through various tests to determine normality and homogeneity (U.S. EPA 2002a). (Note: the statistical procedures are identical to the calculation of the NOEC and LOEC endpoints).**

**iii. No Observed Effect Concentration (NOEC) and Lowest Observed Effect Concentration (LOEC)**

**The No Observed Effect Concentration endpoint can be derived for multi-concentration chronic toxicity tests. Similar to the NOAEC, the NOEC is calculated using Dunnett's Procedure or Bonferroni's adjustment for multiple comparisons when an unequal number of replicates are used. If normality assumptions are not met, Steel's Many-one Rank Test is used in place of Dunnett's Procedure, and the Wilcoxon Rank Sum test is paired with Bonferroni's adjustment. The NOEC endpoint is obtained from the highest concentration of an effluent that does not cause an observable, adverse effect on the test organisms. Derived in conjunction with the NOEC, the LOEC denotes the lowest concentration of effluent at which the test species are adversely affected (U.S. EPA 1991; U.S. EPA 2002a; U.S. EPA 2002b[4]). Results are typically reported as chronic or acute "Toxicity Units" (denoted as TUc and TUa respectively) that are calculated by dividing 100 by the NOEC.**

**c Point Estimate Methods.**

**i. Effect Concentrations (EC)**

**[4] U.S. Environmental Protection Agency. 2002b. Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms (4th Edition). EPA 821-R-02-013. Washington, DC: Office of Water**

**The Effect Concentration refers to a quantity of treatment at which a certain percentage of a given number of test species exhibit a negative quantal response (e.g. death or immobilization). This percentage, established in a discharger's permit, is denoted in the acronym, (e.g. 25% is represented as EC25). The EC is useful for a multi-concentration toxicity test and is evaluated using point estimate techniques. This method is akin to a linear regression, but rather than exhibiting a linear fit, the data is incorporated using a log-normal function. Due to the complexity of this method, a Probit software program is typically utilized for data that fits the required parameters. The Spearman-Karber, Trimmed Spearman-Karber, and Graphical methods may be used in place of Probit for data sets that exhibit specific characteristics (U.S. EPA 2002b).**

**ii. Lethal Concentrations (LC)**

**The Lethal Concentration endpoint measures the quantity of an effluent that causes death in a predetermined percentage of test organisms. Similar to the EC, this quantity is identified in the acronym. Probit software is frequently utilized to perform the difficult calculations required for the LC endpoint. Acute toxicity data that neither meets the normality assumption nor contains at least two mortalities, however, cannot be entered into a Probit analysis. For these data sets, the Spearman-Karber, Trimmed Spearman-Karber, and Graphical methods are employed (Denton et al. 2007[5]).**

**iii. Inhibition Concentration (IC)**

**Used to measure the chronic, non-quantal effects of a discharge, the Inhibition Concentration is computed from the actual effluent dilutions at which negative impacts were observed. Akin to the EC and LC, the formula for calculating the IC (Linear Interpolation) is dependent upon the characteristics of the available data, and the percentage of test organisms affected by an effluent sample is also designated in the acronym. As with all point estimate techniques, intra-laboratory and inter-laboratory variability can be determined by calculating the coefficient of**

**[5] Denton DL, Miller JM, Stuber RA. 2007. EPA Regions 9 and 10 Toxicity Training Tool. Nov 2007. San Francisco, CA: U.S. Environmental Protection Agency**

**variation (CV) percentage (U.S. EPA 1991[6]; U.S. EPA 2002b).**

**The selected statistical method for analyzing effluent toxicity data shall be implemented subject to the approval of the San Diego Water Board.**

**11. Attachment F, *Fact Sheet*, Page F-36**

**1. Satisfaction of Anti-Backsliding Requirements**

Sections 402(o)(2) and 303(d)(4) of the CWA and 40 CFR 122.44(l) prohibit backsliding in NPDES permits. These anti-backsliding provisions require effluent limitations in a reissued permit to be as stringent as those in the previous permit. The effluent limitations in this Order are at least as stringent as the effluent limitations in the previous Order and meet State and federal anti-backsliding requirements.

**The numeric effluent limitation for acute and chronic toxicity have been removed and replaced with a narrative chronic toxicity limitation. Because chronic toxicity is considered to be a more conservative indicator of toxicity, and the monitoring of all wastewater sample locations for both acute and chronic toxicity would be costly and redundant, the monitoring requirements and effluent limitations for acute toxicity have been removed. The removal of the acute toxicity effluent limitation will not impair beneficial uses and its removal is consistent with Section 40 CFR 122.44(l)(1). The narrative limitation for chronic toxicity is at least as stringent as the effluent limitations in the previous Order.**

**12. Attachment F, *Fact Sheet*, Page F-46**

**Table F-17. Effluent Monitoring Requirements for Discharge Nos. 001 and 002.**

| Parameter | Units | Sample Type | Minimum Sampling Frequency |
|---|---|---|---|
| Flow | MGD | Continuous | Continuous |
| pH | Units | Grab/Continuous | Weekly |
| Residual Chlorine | µg/L | Grab/Continuous | Weekly |
| Fecal Coliform | MPN/100 mL | Grab | Weekly |
| Total Coliform | MPN/100 mL | Grab | Weekly |
| Enterococcus | CFU/100 mL | Grab | Weekly |

[6] U.S. Environmental Protection Agency). 1991. *Technical Support Document for Water Quality-based Toxics Control*. EPA/505/2-90-001. U.S. Environmental Protection Agency, Office of Water, Washington, DC.

| Parameter | Units | Sample Type | Minimum Sampling Frequency |
|---|---|---|---|
| Temperature | °C | Grab/Continuous | Monthly |
| Copper, Total Recoverable | µg/L | 24-hour composite | Quarterly[1] |
| Suspended Solids | mg/L | 24-hour composite | Quarterly |
| Settleable Solids | ml/L | Grab | Quarterly |
| Oil and Grease | mg/L | Grab | Semi-annual |
| Ammonia | mg/L | 24-hour composite | Semi-annual |
| Silver, Total Recoverable | µg/L | 24-hour composite | Semi-annual |
| Turbidity | NTU | 24-hour composite | Semi-annual |
| **Chronic Toxicity** | ~~**Pass/Fail**~~ | **24-hour composite** | **Annual** |
| Priority Pollutants[2] | µg/L | 24-hour composite | Once in 5 years[2] |

**13. Attachment F, *Fact Sheet*, Page F-47**

**C. Whole Effluent Toxicity Testing Requirements**

Whole effluent toxicity (WET) limitations protect receiving water quality from the aggregate toxic effect of a mixture of pollutants in the effluent. This Order contains limitations and monitoring requirements for chronic toxicity for EFF-001 and EFF-002. Whole effluent toxicity testing shall be conducted by the methods specified in section V.A~~. through V.E.~~ of this MRP. This Order requires chronic toxicity monitoring annually. No acute toxicity monitoring is required.

**14. Attachment F, *Fact Sheet*, Page 51**

**C. Public Hearing**

The Regional Water Board will hold a public hearing on the tentative WDRs during its regular Board meeting on the following date and time and at the following location:

Date: ~~**May 11, 2011**~~ **June 8, 2011**
Time: **9:00 AM**
Location: **Regional Water Quality Control Board**
**Regional Board Meeting Room**
**9174 Sky Park Court, Suite 100**
**San Diego, CA 92123**