

EXHIBIT 6
ADMINISTRATIVE RECORD # 60

NPDES PERMIT NO. TX0054186

FACT SHEET

FOR THE DRAFT NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT TO DISCHARGE TO WATERS OF THE UNITED STATES

I. APPLICANT

San Jacinto River Authority (SJRA)
Woodlands Wastewater Treatment Plant No. 1
2436 Sawdust Road
The Woodlands, TX 77380

II. ISSUING OFFICE

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IV. DATE PREPARED

January 20, 2009

V. PERMIT ACTION

The Environmental Protection Agency (EPA) proposes to modify the National Pollutant Discharge Elimination System (NPDES) permit issued on September 29, 2007. This permit was the subject of a petition before EPA's Environmental Appeals Board (EAB) before specific contested provisions of the permit were withdrawn. Those provisions of the permit that were not withdrawn remain in effect. This action modifies the existing permit to address those then-contested elements that were withdrawn. Unless otherwise stated, citations to "40 CFR" refer to EPA regulations published in Title 40 of the Code of Federal Regulations. Citations to 30 TAC refer to promulgated regulations listed in Title 30 of Texas Administrative Code.

VI. MODIFICATIONS TO EXISTING PERMIT

Modifications to the permit issued on September 28, 2007, with an effective date of November 1, 2007, and an expiration date of October 31, 2012, are:

- A. New limitations for E. coli have been added.
- B. Report requirements have been added for copper.
- C. Whole effluent toxicity limits have been added with a three-year compliance schedule.
- D. Outfall 002 has been established as a separate outfall with limitations for 5-day carbonaceous biochemical oxygen demand, ammonia nitrogen and dissolved oxygen more stringent than their limits when they were included in Outfall 001.
- E. Outfall 002 has a maximum daily rate limitation.

VII. DISCHARGE LOCATION

As described in the application, the plant site is located at 2436 Sawdust Road, The Woodlands, Montgomery County, Texas. The discharge from the facility is through Outfalls 001 and 002. Outfall 001 is located at Latitude 30° 08' 06" North, Longitude 95° 28' 38" West. Outfall 002 is located at Latitude 30° 08' 31.5" North, Longitude 95° 28' 14.9" West.

VIII. APPLICANT ACTIVITY

Under the Standard Industrial Classification (SIC) Code 4952, the applicant operates a publicly owned treatment works (POTW), serving a population of 37,333.

The treatment provided at the facility includes bar screens, a degritter, aeration basins, secondary clarifiers, tertiary filters to enhance sediment control, followed by chlorine contact chambers, aeration, dechlorination then metering and discharge through the outfall. The design flow for the plant is 7.8 MGD. Sludge is treated by aerobic digesters, gravity thickening and lastly a belt press. Sludge is disposed by land application as Class B biosolids. The facility has a sludge management and disposal plan on file.

IX. REASON FOR PERMIT MODIFICATION

The EPA proposed a draft permit for public notice and comment on December 7, 2007. SJRA filed comments to the draft permit on February 19, 2007. EPA responded to the comments filed by SJRA and issued a final permit on September 28, 2007. On October 29, 2007, SJRA filed a petition for review of certain conditions of the NPDES permit with the EAB. On March 6, 2008, the Texas Commission on Environmental Quality (TCEQ) notified EPA that the TCEQ information used by EPA to determine critical dilution in the permit was incorrect. Based on this notification, on March 14, 2008, EPA filed a notice with the EAB withdrawing the then-contested provisions of the permit. On March 28, 2008, the EAB issued an order dismissing the SJRA's petition with prejudice.

EPA is now proposing modifications to the permit that address whole effluent toxicity (WET) limits, bacteria limitations, and copper monitoring for Outfall 001. Regulations at 40 §CFR 124.19(d) authorize EPA to withdraw contested portions of a permit prior to the EAB rendering a decision granting or denying review of a permit decision, and to prepare a new draft permit.

Additionally, EPA is modifying the 5-day carbonaceous biochemical oxygen demand (CBOD₅), ammonia nitrogen (NH₃N), dissolved oxygen (DO) and flow limits for discharges from Outfall 002 to Harrison Lake.

X. DRAFT PERMIT MODIFICATION RATIONALE AND PROPOSED PERMIT CONDITIONS

A. WATER QUALITY SCREENING

1. General Comments

Pursuant to 40 CFR §122.44, the draft permit limits are based on either technology-based effluent limits, pursuant to 40 CFR §122.44(a) or on Texas Surface Water Quality Standards (WQS) and the requirements of 40 CFR §122.44(d), whichever are more stringent.

§ 301(b)(1)(C) of the Clean Water Act (CWA) requires that effluent limitations for point sources include any limitations necessary to meet water quality standards. 40 CFR §122.44(d) provides that if a discharge poses the reasonable potential to cause an in-stream excursion above a water quality criterion, the permit must contain an effluent limit for that pollutant. If the discharge has the reasonable potential to cause an in-stream violation of narrative standards, the permit must contain prohibitions to protect that standard.

Additionally, the WQS provide that "surface waters will not be toxic to man from ingestion of water, consumption of aquatic organisms, or contact with the skin, or to terrestrial or aquatic life." 30 TAC Chapter 307. The methodology to implement those WQS is outlined in the document, "Implementation of the Texas Commission on Environmental Quality Standards via Permitting" (IP). The IP is designed to insure compliance with 30 TAC Chapter 307 which establishes that no source will be allowed to discharge any wastewater which (1) results in instream aquatic toxicity, (2) causes a violation of an applicable narrative or numerical state water quality standard, (3) results in the endangerment of a drinking water supply, or (4) results in aquatic bioaccumulation which threatens human health.

The IP document is not a state water quality standard, but rather, a non-binding, non-regulatory guidance document. See IP at page 2 stating that "this is a guidance document and should not be interpreted as a replacement to the rules." EPA does not consider the IP to be a new or revised water quality standard and has never approved it as such. EPA did comment on and conditionally approve the IP as part of the Continui... Planning Process required under 40 CFR §130.5(c) and the Memorandum of Agreement between Texas Natural Resource Conservation Commission (now TCEQ) and EPA, but this does not constitute approval of the IP as a water

quality standard under CWA §303(c). Therefore, EPA is not bound by the IP in establishing limits in this permit – but rather, must ensure that the limits are consistent with the EPA-approved state WQS. Where IP procedures are consistent with state and federal law, EPA has made an effort to use those procedures.

2. Reasonable Potential - Procedures

Methods for the determination of permit limits are set forth in the IP. Wasteload allocations (WLAs) are calculated using estimated effluent dilutions, criteria outlined in the WQS and partitioning coefficients for metals when appropriate and designated in the IP. The WLA is the end-of-pipe effluent concentration that can be discharged and still meet instream criteria after mixing with the receiving stream. From the WLA, a long-term average (LTA) concentration is calculated for both chronic and acute toxicity, using a log-normal probability distribution, a given coefficient of variation (0.6), and either a 90th or a 99th percentile confidence level. The IP recommends use of the 90th percentile confidence level for discharges to rivers, freshwater streams and narrow tidal rivers with upstream flow data, and the 99th percentile confidence level is for the remainder of cases. For facilities that discharge into receiving streams that have human health standards, a separate LTA will be calculated. The implementation procedures for determining the human health LTA use a 99th percentile confidence level, along with an established coefficient of variation (0.6). The lowest of the calculated LTA's (acute, chronic and/or human health), is used to calculate the daily average and daily maximum permit limits.

The IP procedure for determining reasonable potential for chemical-specific permit limits is to compare the reported analytical data from the discharge monitoring report history and/or the application information against percentages of the calculated daily average water quality-based effluent limitation. The more stringent of the calculated water quality based effluent limitations are compared against analytical data included with the permit application. Under the Texas IP, a discharge would cause, have the reasonable potential to cause, or contribute to non-attainment of a WQS (i.e., permit limitations are required) when analytical data reported in the application exceed 85% of the calculated daily average water quality-based effluent limitation.

3. Rationale for Separate Outfall Limits

The uncontested portions of the permit have identical limitations for both Outfall's 001 and 002. On July 16, 2008, EPA approved an update to the Texas Water Quality Management Plan (WQMP) for discharges to tributaries of Spring Creek, Segment 1008 of the San Jacinto River Basin. (Copy of letter as Attachment E.) This update to the WQMP was the result of a DO model conducted by TCEQ to ensure that discharges from Outfall 001 to Panther Branch and from Outfall 002 to Harrison Lake; both tributaries to Spring Creek would be protective of DO levels in those waters. (Copy of letter as Attachment E) The DO model showed that 30-day average permit limits of 15 mg/l CBOD₅, 6 mg/l NH₃N and daily minimum 4 mg/l DO were protective of discharges from Outfall 001 to Panther Branch for the full design flow of 7.8 million gallons per day (MGD). However, those levels would not ensure DO protection for discharges from Outfall 002 to Harrison Lake. The DO model for Harrison Lake indicated that

for the full design flow of 7.8 MGD, no effluent limits could be recommended for Outfall 002. Prior to TCEQ's proposed WQMP update, SJRA consented to reduced flow and more restrictive pollutant treatment levels for Outfall 002 in a letter to TCEQ March 4, 2008. (Copy of letter as Attachment E.) The letter requested that Outfall 002 be permitted to 0.6 MGD, 30-day average permit limits of 7 mg/l CBOD₅, 2 mg/l NH₃N and a daily minimum 6 mg/l DO. The DO model limits the combined flow from both outfalls to a maximum of 7.8 MGD, the design flow of the facility.

The maximum flow rate of 0.6 MGD into Outfall 002 is considerably less than the minimum flow from the facility and will require that at any time discharge through Outfall 002 occurs; a significant portion of treated effluent will also have to discharge through Outfall 001. Therefore, when any discharge into Outfall 002 occurs, the most limiting permit conditions of either of the two outfalls will establish permit limits.

4. Reasonable Potential – Calculations

a. CRITICAL DILUTION - OUTFALL 001

The "critical dilution" refers to the amount of effluent flow in-stream relative to the entire stream flow under reasonable "low flow" conditions. NPDES permitting agencies use the critical dilution to determine the likelihood that a chemical pollutant may exceed a numeric criterion in applicable WQS and then, if necessary, to determine applicable permit limits and conditions. NPDES agencies also use the critical dilution to establish Whole Effluent Toxicity (WET) monitoring requirements, to determine the need for WET limits, and where necessary, those applicable WET limits.

The critical dilution, CD, is calculated as:

$$CD = Q_E / Q_E + Q_A$$

Where:

CD is the critical dilution

Q_E is the effluent flow, for a POTW the design flow, in millions of gallons per day (MGD),

Q_A is the low-flow or 7Q₂, in MGD

The 7Q₂ flow is a critical variable in determination of the critical dilution. The Texas IP states that "[e]ffluent limits in TPDES wastewater discharge permits are designed to maintain the applicable numerical water quality standards for the protection of aquatic life when instream flows are at or above the 7Q₂." (See TCEQ IP document at page 43). The 7Q₂ is defined in the WQS as "the lowest average stream flow for seven consecutive days with a recurrence interval of two years, as statistically determined from historical data." The EPA requested that TCEQ provide the critical dilution for this permit.

For development of the original draft permit on September 19, 2006, the TCEQ provided EPA with a 7Q2 of 2.2 cubic feet/second (cfs). After EPA had published the draft permit on December 7, 2006, the TCEQ provided EPA with a revised 7Q2 of 5.32 cfs based on a larger dataset of receiving stream flow measurements.

On March 6, 2008, prior to the filing of EPA's substantive response to the SJRA petition for review, the TCEQ notified EPA that the State had incorrectly calculated the revised 7Q2 due to a technical error, and that the correct 7Q2 value is 3.32 cfs. (Copy of email as attachment E).

In developing today's proposal, EPA used this 3.32 cfs value to calculate the critical dilution to be used for discharges into the receiving water, Spring Creek, TCEQ Segment 1008:

$$CD = Q_E / Q_E + Q_A$$

Where:

$$Q_E = 7.8 \text{ MGD}$$

$$Q_A = 3.32 \text{ cfs or } 2.146 \text{ MGD; based on } 1 \text{ cfs} = 0.646 \text{ MGD}$$

$$CD = 7.8 / 7.8 + 2.146$$

$$CD = 78.4\%, \text{ rounded to } 78\%$$

b. CRITICAL DILUTION - OUTFALL 002

Critical dilutions for lakes are not calculated in the same manner as streams. TCEQ provided a critical dilution of 60% for discharges to Lake Harrison through Outfall 002. Since any flow through outfall 002 is simply a diversion from outfall 001 EPA has determined that all outfalls are required to meet the more restrictive 78% critical dilution

c. OUTFALL 002 LIMITATIONS

Effluent limitations established in the WQMP require more restrictive limits for CBOD₅, NH₃N and DO. Consistent with the approved WQMP, the flowing limitations are proposed in the draft permit.

Outfall 002

Pollutant	lbs/day, unless noted		mg/l, unless noted	
	30-Day Avg	7-Day Avg	30-Day Avg	7-Day Avg
CBOD ₅	37.0	50.1	7	10
NH ₃ N	10.0	25.0	2	5

Pollutant	mg/l, unless noted	
	Minimum	Maximum
DO	6.0	N/A

Mass limitations are calculated as follows:

$$\text{Loading (lbs/day)} = \text{Pollutant concentration in mg/l} \times 8.345 \text{ lbs/gal} \times 0.6 \text{ MGD}$$

d. COPPER – OUTFALL 001

i. IP Procedures Regarding Monitoring-Only Requirements in Permits

The IP provides recommendations for the use of monitoring requirements in permits. The IP at p. 83 reads: “If the average of the effluent data equals or exceeds 70% but is less than 85% of the calculated daily average limit, monitoring for the toxic pollutant will usually be included as a condition in the permit.” Monitoring requirements are often established in permits to evaluate levels of pollutant discharges over a longer period of time, particularly if a pollutant exhibits the potential for violating applicable WQS and, depending on this larger data set, may require the establishing of a limit upon permit renewal or through permit modification (through the standard reopener clause in permits).

ii. Effluent Data and Variability

SJRA submitted effluent values for copper shown in the table below as part of the original NPDES permit application, as part of its earlier Petition for Review to the EAB, as part of its Texas permit renewal application or as part of a toxicity investigation evaluation (TIE). The data show variability in copper effluent concentrations over a five-month period.

Date Sampled	Copper, ug/l	Source
May 5, 2006	12.6	NPDES Application
May 9, 2006	<10.0	NPDES Application
May 11, 2006	<10.0	NPDES Application
June 26, 2007	<10.0	Texas Application
July 3, 2006	9.5	TIE
October 2, 2006	9.16	TIE
October 4, 2006	9.4	TIE
October 6, 2006	8.52	TIE

The small sample set shows effluent variability in pollutant levels consistent with the varying nature of a POTW, which does not control the amount, nature or level of pollutant loading of the influent from residential, commercial and industrial sources. Using only the results reported above the level of detection, the mean for the five concentrations is 9.84 µg/l.

iii. TEXTOX Menu 3 Calculations

TCEQ uses a spreadsheet called TEXTOX to calculate the daily average limit. The TCEQ identifies which specific TEXTOX menu to use based on conditions outlined in the IP. Previously, TCEQ determined that for this discharger, the use of TEXTOX Menu 3, “Discharges

to Freshwater Streams,” is appropriate. As previously discussed, TCEQ provided to EPA the 7Q2 of 3.32 cfs and the harmonic mean flow of 11.43 cfs to be used in the spreadsheet. Additional data needed to perform the calculations are found in the WQS. Table 5 of the WQS presents segment specific values for TSS, pH, hardness, TDS, chlorides and sulfates. For the receiving stream, Segment Number 1008, TSS is 13 mg/l, pH is 6.7 su, hardness is 30 mg/l equivalent CaCO₃, TDS is 239 mg/l, chloride is 53 mg/l and sulfate is 10 mg/l.

The EPA approved acute and chronic WQS for copper are hardness dependent (meaning the toxicity of the metal concentration in the effluent varies depending on the hardness of the receiving water) and are described as follows:

$$\text{Acute: } e^{(0.9422 [\ln(\text{hardness})] - 1.3844)}$$

$$\text{Chronic: } e^{(0.8545 [\ln(\text{hardness})] - 1.386)}$$

Using the 30 mg/l hardness value from Table 5 of the WQS, the calculated freshwater acute copper standard is 6.17 ug/l and the chronic copper standard is 4.57 ug/l and these values are shown on the attached Menu 3, Page 2, Aquatic Life, under the columns acute and chronic standards. The same page of Menu 3, under the column Daily Avg., shows that the daily average limit is 16.89 ug/l.

iv. Menu 3 Compared to Effluent Data

Based on the Texas IP recommendations, monitoring requirements for copper would normally be established when the effluent data is found to be greater than 70% of the daily average limit or 11.82 ug/l ($16.89 \text{ ug/l} \times 0.70 = 11.82 \text{ ug/l}$). At least one data value, 12.6 ug/L, reported in the application is greater than this value.

v. Other Considerations

Among results of SJRA Toxicity Identification Evaluations evaluation report developed by Advent-Environ and presented to SJRA dated October 19, 2005, it was noted that Granular Activated Carbon (GAC) treatment was shown to reduce chronic toxicity measured as an impairment to reproductive success of aquatic life. The report states that only general conclusions can be drawn from these results because samples were not evaluated for chemical constituents. The report does discuss that reductions in toxicity by activated carbon treatment is an indicator of the presence of an “organic probably non-polar or metal such as zinc or copper.”

vi. Rationale for Copper Monitoring

Effluent analysis shows that the level of copper in the effluent is variable. At least one sample in the limited data set occurred at a level above the TCEQ threshold level for requiring monitoring. The facility receives wastestreams from industrial activities where variable loadings of pollutants, including copper, may be present. As noted above, the applicant also submitted a TIE report which indicated that copper was a possible a contributor to its toxicity problems.

The inclusion of monitoring requirements is consistent with the CWA. Under CWA §308(a) and 402(b)(2), EPA has broad discretion to establish monitoring conditions in permits. The existence of the single evaluated data point suggests that the discharge may not assure compliance with applicable water quality standards. The proposed sampling and reporting of data over a longer period of time will generate a data set representative of a wider range of operational conditions including, but not limited to, climate conditions, such as wet weather events, varying flow rates and plant operations, upon which a more definitive determination regarding attainment of copper water quality standards can be established. Based on these considerations, EPA believes it is appropriate to establish a monitoring requirement for copper.

e. BACTERIA – OUTFALL 001

The Texas WQS for Spring Creek (Waterbody Segment 1008) include standards for E. coli bacteria to support contact recreation uses. The 30-day geometric mean is 126 colony forming units (cfu)/100 ml, and no single sample shall be greater than 394 cfu/100 ml. Additionally, Spring Creek is listed on the 2008 Texas list for impaired and threatened waters (developed pursuant to CWA § 303(d)) due to elevated bacteria levels. The stream was first listed as impaired for bacteria in 1996 and is classified on the 2008 Integrated Report (developed pursuant to both CWA §§303(d) and 305(b)) as a Category 5a waterbody. A Category 5a waterbody classification means that the waterbody does not meet applicable WQS or is threatened for one or more designated uses by one or more pollutants and that a TMDL is underway, scheduled, or will be scheduled.

The TCEQ has established a rule, “Domestic Wastewater Effluent Limitations and Plant Siting” published at 30 TAC §309, that addresses disinfection at POTWs. This rule “...promulgates a set of effluent quality limitations for treated domestic sewage which will be required of permittees as appropriate to maintain water quality in accordance with the commission’s surface water quality standards.” This rule further states “[w]here chlorination is utilized, any combination of detention time and chlorine residual where the product of chlorine (Cl_2 mg/l × Time (T minutes) equals or exceeds 20 is satisfactory provided that the minimum detention time is at least 20 minutes and the minimum residual is at least 0.5 mg/l.” See 30 TAC 309.3(g)(2). TCEQ has not historically required bacterial monitoring for these facilities to verify whether these control measures are effective at controlling bacteria to levels necessary to protect recreational uses. As a practical matter, the State implicitly recognizes that POTW discharges that require disinfection under 30 TAC § 309 threaten recreational uses of receiving streams, and thus require disinfection per se.

In drafting this permit modification, EPA relied on 40 CFR §122.44(d)(1)(i) - (iii) to establish limitations for E. coli bacteria. EPA does not consider measurement of total residual chlorine to be an adequate “indicator” for the pollutants of concern, human pathogens. E. coli is itself an indicator pollutant for those pathogens and Texas WQS provide numeric criteria for E. coli, which can be measured directly with approved analytic testing procedures. EPA guidance recommends that NPDES permits for POTWs include water quality-based limits on the bacterial

indicator pollutant, in this case, E. coli, in order to assure compliance with numeric bacterial criteria at the end-of-pipe. See memorandum from the EPA Deputy Assistant Administrator for Water Enforcement to the EPA Regional Directors and Permit Branch Chiefs (Feb. 14, 1977). EPA developed this guidance after the Agency had acted on July 26, 1976, to remove fecal coliform bacteria as a pollutant of concern from the technology-based secondary treatment requirements. This guidance recommends that "effluent limitations for fecal coliforms should be set at the same level as are required in-stream." In contrast, the State disinfection (including chlorination) requirements at 30 TAC § 309 are technology controls that may or may not effectively control human pathogenic bacteria.

Permits must include not only those limits that are technology based, but also any more stringent limits that are necessary to meet water quality standards. Pursuant to federal regulation at 40 CFR §122.44(d)(1)(iii), if a discharge causes, has the reasonable potential to cause, or contributes to an in-stream excursion above a numeric criterion of a state water quality standard for an individual pollutant, the discharge permit must contain effluent limitations for that pollutant. Applicable Texas regulations at 30 TAC § 305.531(3) incorporate this federal regulation by reference. In 2004, EPA approved revised Texas water quality standards for Enterococci and E. coli.

EPA's longstanding position was published in the 1989 Federal Register preamble supporting the federal regulation at 40 CFR §122.44:

Today's regulations do not allow the permitting authority to use indicator parameters under paragraphs (d)(1)(iii) and (iv). Indicator parameters may not be used to develop effluent limitations under these paragraphs because, under these paragraphs, the state has promulgated a numeric criterion for the pollutant of concern. Such a numeric criterion represents a state's affirmative decision with respect to the maximum allowable ambient concentration for the pollutant. If paragraphs (d)(1)(iii) and (iv) provided for the use of indicator parameters, such provisions could frustrate the state's efforts to promulgate and implement water quality standards. EPA is limiting the use of indicator parameters to paragraph (d)(1)(vi) because this paragraph is intended as an interim measure employed in the absence of a state numeric criterion for the pollutant of concern, and because EPA seeks to allow the states flexibility to interpret their narrative water quality criteria. 54 Fed. Reg.23868, 23878 (June 2 1989).

The receiving water body for SJRA's effluent is listed by the State as impaired for bacteria pursuant to CWA § 303(d). Whenever there is a discharge of a pollutant to a waterbody impaired for that pollutant, EPA establishes limits for that pollutant in accordance with 40 CFR §122.44(d)(1)(iii) which states "[w]hen the permitting authority determines, using the procedures in paragraph (d)(1)(ii) of this section, that a discharge causes, has the reasonable potential to cause, or contributes to an in-stream excursion above the allowable ambient concentration of a State numeric criteria within a State water quality standard for an individual pollutant, the permit must contain effluent limits for that pollutant."

Since the spring of 2007 EPA has expressed concerns and objected to State-issued NPDES permits regarding TCEQ's practice of not requiring water quality based effluent limitations and monitoring for bacteria. A letter from Mark R. Vickery, Executive Director of TCEQ dated July 10, 2008, outlines TCEQ's approach to address EPA's concerns.

EPA proposes effluent limitations for bacteria of 126 cfu/100 ml, 30-day geometric mean, and 394 cfu/100 ml, single sample maximum. This limitation will protect the WQS. Since the facility has the equipment needed to disinfect the wastewater, adjustments to that equipment are the only changes needed to come into compliance with the bacteria limits, and a compliance schedule will not be needed to achieve the limits.

B. WHOLE EFFLUENT TOXICITY (WET) EVALUATION

1. Background

In order to ensure compliance with the applicable State water quality standards and federal regulations related to the protection of aquatic life, WET testing is required of all major dischargers and minor discharges with known or suspected toxicity. WET measures the aggregate effects of specific effluents on specific receiving streams and may reflect the discharge of toxic substances either known or not known to be present in the effluent in toxic amounts. Normally, the presence and levels of specific pollutants in an effluent (and thus chemical mixtures) tend to vary over time, as indicated by test results. Lethal and sub-lethal effects (for example, impaired growth or reproductive success) are the test endpoints measured by chronic WET testing. Both test endpoints are biologically significant and ecologically important. The TCEQ water quality standards provide specific protection for aquatic life against stream impairment due to both lethal and sub-lethal toxicity. WET testing is recognized by the TCEQ water quality standards as the tool used to measure these effects. The regulations, water quality standards, and analyses regarding the need for permit limits are designed to protect receiving waters from toxic discharges, not to react to them after such effects become manifest. As such, and depending on the variability of test results, a discharge's reasonable potential to exceed the state narrative water quality standard for the protection of aquatic life effluent toxicity may be reasonably predicted, and WET limits may be required, even where toxicity has not been demonstrated in-stream.

WET testing is vital to the effective control of toxic pollutants in the Nation's waters under the CWA because chemical-specific limits alone may have "blind spots" regarding the full toxic effect of a facility's effluent. A facility's effluent may be toxic to aquatic life, even though the causative chemical may not be identified in the relatively short list of pollutants for which the permitting authority must evaluate the need for water quality based effluent limits (WQBELs). In other cases, a single discharge of several chemicals, any of which may meet individual chemical specific WQBELs, still may be toxic because of the additive and/or synergistic effects of the chemical mixture. This is one of the principal capabilities of whole effluent toxicity testing, as presented on page 21 of EPA's primary NPDES permitting guidance, the Technical

Support Document for Water Quality-based Toxics Control (TSD) EPA/505/2-09-001, 2d printing, March 1991):

The principal capabilities of whole effluent techniques are:

- a. The aggregate toxicity of all constituents in a complex effluent is measured, and toxic effect can be limited by limiting one parameter - whole effluent toxicity.
- b. Toxicity caused by compounds commonly not analyzed for in chemical tests is detected. Control of the toxicant is not dependent upon established toxicological information that may not yet be available for some pollutants.
- c. The bioavailability of the toxic constituents is assessed, and the effects of interactions of constituents are measured. Additivity, synergism, and antagonism between compounds in an effluent are addressed implicitly by whole effluent toxicity.
- d. The toxicity of the effluent or ambient water is measured directly for the species tested.
- e. This approach allows prediction of ecological impacts before they occur. NPDES permit limits can therefore be developed before an actual ecological impact occurs.

Thus, WET testing can determine the integrated effects of all chemicals in a single effluent sample and detect toxicity caused by pollutant parameters for which there exists no chemical-specific numeric water quality standards, criteria or test methods. Finally, WET testing is the only direct way to measure the toxic effects of the effluent on organisms exposed to that effluent.

WET testing applies the same basic principle as all modern biological testing methods: the comparison of a specific biological outcome in an exposed group of organisms (experimental group) to an unexposed group (control group), to test the hypothesis that the biological outcome can be attributed to the exposure. Before any conclusions can be made from such comparisons, the results are analyzed statistically, to ensure – with reasonable certainty – that any observed difference was statistically significant and not due to random chance.

In WET testing, small groups of organisms in representative species of various taxa of aquatic life, e.g., fish, invertebrates, plants, are exposed to specified concentrations of effluent, in a controlled laboratory setting, to determine the acute or chronic effects of the effluent on replicate groupings and exposure of those testing organisms. These test organisms are typically born and cultured in laboratories specifically for the purpose of toxicity testing. Representative WET test species have been proven to be suitable for WET testing because of their availability, ease of maintenance, and short reproductive cycles. WET test methods are designed to test for certain

chronic biological outcomes, e.g., survival, growth and reproduction, per Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, EPA-821-R-02-013, at 37 (4th ed. Oct. 2002) (Methods Manual).

2. Regulatory Basis and Authorities

The Clean Water Act requires that NPDES permits contain limitations necessary to meet water quality standards. See CWA §§ 301(b)(1)(C), 402(a)(2). Under CWA § 303, EPA has approved narrative Texas water quality standards that prohibit toxic effects to aquatic life:

Surface waters will not be toxic to man from ingestion of water, consumption of aquatic organisms, or contact with the skin, or to terrestrial or aquatic life. (30 TAC §307.4(d))

Water in the state with designated or existing aquatic life uses shall not be chronically toxic to aquatic life, in accordance with §307.8 of this title. (30 TAC §307.6(b)(2))

Water in the state shall be maintained to preclude adverse toxic effects on aquatic life, terrestrial wildlife, livestock, or domestic animals, resulting from contact, consumption of aquatic organisms, consumption of water, or any combination of the three. (30 TAC §307.6(b)(4))

Chronic total toxicity, as determined from biomonitoring of effluent samples, will be precluded in all water in the state with existing or designated aquatic life uses except in mixing zones and at flows less than critical low-flows, in accordance with §307.8 of this title. (30 TAC §307.6(e)(1) (2000)).

The Texas WQS provide protection against chronic total toxicity (defined as significant lethal or sub-lethal effects as demonstrated in a defined WET test) at the edge of an established mixing zone. That is, there shall be no significant lethal or sub-lethal toxic effects outside the mixing zone. In its IP the TCEQ recommends a methodology for determining the mixing zone and a site-specific effluent critical dilution as the numeric expression / interpretation of the narrative criterion. For the most part, EPA agrees with these TCEQ recommended procedures. EPA does not accept the TCEQ recommendations in the IP that do not fully support the State's approved WQS, including the State's numeric interpretation of a narrative water quality standard. The following discussion explains those instances where EPA does not accept the IP recommendations to the extent such recommendations do not fully support the Texas WQS.

EPA regulations at 40 CFR §§ 122.44(d)(1)(i), (ii) and (v) require an assessment of the effluent's potential to exceed the State's narrative criteria established for the protection of aquatic life. This assessment of the need for a permit limit ("reasonable potential") considers the variability of toxicity, a pollutant parameter, in the effluent. Previous WET test data, where it exists, provides

the basis for EPA's reasonable potential assessment regarding the discharge's potential to interfere with attainment of the narrative WQS for toxicity.

3. WET Testing

The Texas IPs recommend that permits include specific requirements for WET testing. To the extent that these requirements are consistent with EPA regulations and the State WQS, EPA has adopted those recommendations and proposes permit requirements to implement them. A fundamental principle recognized here is that EPA used the critical dilution to determine whether the WQS would be met. This principle is set forth at page 40 of the IP:

Critical Conditions for Aquatic Life Protection

Effluent concentration limits for specific toxic materials are calculated for acute and chronic numerical toxic criteria, as appropriate, using an effluent fraction that represents critical mixing conditions (see the section of this document entitled "Deriving Permit Limits for Aquatic Life Protection" on page 52). This effluent fraction, when expressed as a percentage, is also referred to as the critical dilution, and is used as the primary concentration for whole effluent toxicity testing (see the subsection of this document entitled "Dilution Series, Dilution Water, and Type of WET Test" on page 108).

At page 108 the IP recommends that the effluent critical dilution, as determined by TCEQ and provided to EPA, should be the point at which to determine attainment of water quality standards. The effluent critical dilution essentially represents the numeric expression / interpretation of the water quality standard for the protection of aquatic life:

Dilution Series, Dilution Water, and Type of WET Test

Dilution series. Chronic and 48-hour acute tests are based on the critical dilution in the receiving water. The critical dilution represents the percentage of effluent at the edge of the mixing zone during critical low flow (that is, the 7Q2) or critical mixing conditions. The test results at the critical dilution are statistically compared with the test results at the control dilution (0% effluent) to measure compliance. The permit specifies the critical dilution and the dilution series as well as the type of WET tests required.

4. WET Test Data Evaluation

WET Test Data Analysis

WET test results are measured, analyzed and may be expressed and reported in terms of one or more statistical endpoints. The WET Methods Manual describes two equally acceptable methods: hypothesis testing, using the No Observable Effect Concentration approach; and point

estimation, for example using the Inhibition Concentration (IC). Both endpoints can be determined from the same test. The design and conduct of EPA's toxicity test requires a specific, pre-determined number of effluent concentrations and a non-toxic control, with a standard set of replicates for each concentration. Due to the way in which the organism response data are distributed within a test, a specific test could potentially fail (i.e., indicate toxicity) using both approaches, pass (indicating no toxicity) using both, or, in some cases fail using one approach and pass the other. Nationally, NPDES permitting authorities have required testing under permits using either or both approaches. For chronic toxicity testing requirements in NPDES permits, EPA Region 6 and the NPDES-authorized States within Region 6 have relied on NOEC testing since 1991. Available nearby contract testing laboratories are familiar with and capable of successfully generating valid WET tests using the NOEC, the hypothesis testing approach. The two approaches are further explained below, followed by an example of the test design.

Inhibition Concentration (IC)

The IC is the concentration estimated as a specific "point" at which the effluent concentration would cause a specified percentage reduction IC(p) of test organisms impaired according to the toxic measure, such as impaired survival, reproduction or growth. For IC testing, it is important for the permitting authority to first determine the "acceptable" level of impact (p) on the population that an effluent may demonstrate. To ensure compliance with water quality standards, state WQS agencies specify a standardized IC(p) value rather than specifying the value on a permit-by-permit (or waterbody-by-waterbody) basis. A permitting authority may determine that it is appropriate to allow up to 25% of the test organisms to die or be otherwise impaired (i.e., demonstrate significantly reduced growth or reproduction). The 25% threshold value would be called an IC₂₅ and the statistical analysis would indicate the percent of effluent that would result in impairment in survival, growth or reproduction of 25% of the population of affected organisms. A moderately more conservative IC(p) approach would be an IC₂₀, which would project the effluent concentration that would result in only a 20% effect. Usually the IC(p) projected by the test data is not one of the effluent dilutions actually tested; rather, the reported IC(p) is an inferred value based on all the data produced in the test, hence, a "point estimation" of a specific concentration based on all of that data.

No Observable Effect Concentration (NOEC)

The WET method manual defines NOEC as the highest concentration of toxicant that causes no observable (i.e., statistically significant) adverse effect on the organisms. Permits written by EPA Region 6 and authorized States within Region 6 have required that the effluent critical dilution be included as one of the effluent dilutions to be tested. This is to detect any significant effect(s) at the specific effluent concentration that must be protected in the stream receiving the effluent in order to attain the narrative WQS for toxicity. A statistical comparison is made between data from the non-toxic control and pooled data from the replicates of each effluent concentration tested. If a statistically significant difference is detected between the results for an effluent concentration and the control, and the difference is so great that it can be concluded with reasonable certainty (e.g., with 95% certainty) that the difference is not due to random chance,

then that concentration of effluent is noted as having demonstrated significant toxic effects and the tests "fails" assuming that the conduct of the test otherwise meets test acceptability criteria to generate a "valid" result.

Both the IC_{25} and NOEC have inherent statistical advantages and disadvantages and neither method is considered to be necessarily superior to the other. Both analyses are influenced by the concentrations examined in a test, control variability, and the occurrence of perceived outliers. EPA's *Technical Support Document for Water Quality-based Toxics Control* (TSD, EPA 1991) recognizes both NOEC and IC_{25} as valid endpoints (e.g., the examples given for TUC on page 6 and page 58 use NOEC and not IC_{25} in the calculation). Further, the TSD reports that the NOEC is approximately the analogue of IC_{25} for WET tests (p.6). Therefore, large differences in the conclusions drawn based on use of either approach in evaluating WET test results are not expected. In support of this, the TSD (Appendices A-1 and A-2) demonstrates that NOEC values reported by several labs were typically quite similar to the corresponding IC_{25} for the same toxicant or effluent. In support of this, EPA has recently evaluated the results of *Ceriodaphnia dubia* chronic reproduction data gathered by the State of North Carolina (269 tests submitted by discharges). This analysis confirmed that use of the IC_{25} and NOEC analysis methods resulted in the same interpretation of the test results (i.e., pass or fail) more than 90% of the time (see Figure 1).

In general, the NOEC provides greater protection than the IC_{25} (see Figure 2). In tests with normal within-test variability, NOEC can detect at least a 25% effect when it occurs and oftentimes, a slightly lower effect level (i.e., 20-25% effect). IC_{25} can not yield a conclusion of toxicity at an effect lower than 25%, even if a significant biological effect has been measured. A higher level of protection near the 25% effect level is desired for compliance WET testing because such testing is generally carried out fairly infrequently (once per month at most) and the effluent quality is often inherently variable, both conditions which could result in undetected discharges of toxic materials.

The NOEC has the advantage of being based upon a significant difference between performance of control organisms and those exposed to one or more test treatments, rather than a set reduction in performance. The Pellston workshop on WET (1995) stated: "Indeed, so long as the comparison of the control and a single effluent concentration (the RWC) remains the critical point of WET testing, hypothesis testing (i.e., NOEC) may remain the statistical method of choice." An additional advantage of the NOEC approach is that it can determine statistical power and Type I and II error rates; these statistical properties can not readily be determined using the IC_{25} approach.

Early studies of the error and variability associated with use of the NOEC indicated problems (e.g., statement in TSD (p.6) regarding "... the error and variability associated with this type of statistical analysis (the control and one effluent concentration (i.e., the RWC) is large"). However, this and similar statements were based on early chronic WET data (pre-1990) and associated analyses (e.g., Warren Hicks 1990), before methods were standardized and labs became familiar with these methods. More recent information regarding point estimates, such as

reproduction or growth). TCEQ recommends use of the NOEC as the WET test evaluation method in all TPDES permits.

Another strength of the NOEC approach (as adjusted by Region 6), is that the effluent critical dilution is always included as one of the effluent testing concentrations and, where possible, is bracketed by higher and lower effluent dilutions. By testing the actual effluent critical dilution, compliance with the narrative criterion can be determined directly without further interpretation. Test results from the lower effluent concentrations tested provide additional information, such as the magnitude of toxicity in the effluent (a test may fail at the critical dilution, but it may also fail at the lower effluent concentrations tested indicating greater toxicity and potential effects in the stream. In fact, EPA's TSD and the promulgated WET test methods both recommend against WET testing that does not include those additional effluent concentrations. Section 2.2.3 of EPA's Freshwater Chronic testing manual states:

“Use of pass/fail tests consisting of a single effluent concentration (e.g., the receiving water concentration or RWC) and a control is not recommended. If the NPDES permit has a whole effluent toxicity limit for acute toxicity at the RWC, it is prudent to use that permit limit as the midpoint of a series of five effluent concentrations. This will ensure that there is sufficient information on the dose-response relationship.”

In addition, section 8.10.1 on page 36 of the manual, states:

8.10.1 The tests recommended for use in determining discharge permit compliance in the NPDES program are multi-concentration, or definitive, tests which provide (1) a point estimate of effluent toxicity in terms of an IC25, IC50, or LC50, or (2) a no-observed-effect-concentration (NOEC) defined in terms of mortality, growth, reproduction, and/or teratogenicity and obtained by hypothesis testing. The tests may be static renewal or static non-renewal.

Thus test results, when measured and reported as NOEC values, are used to determine compliance and, at permit reissuance, the need for permit limits for WET. The limit procedure adopted by EPA is based on EPA's TSD. This analysis is similar to the procedure used to assess the need for permit limits on chemical compounds. However, WET testing is usually performed on a very infrequent basis relative to the testing of other pollutants and pollutant parameters. When it is determined that, “a discharge causes, has the reasonable potential to cause, or contributes to an instream excursion above a narrative criterion within an applicable State water quality standard, the permit must contain effluent limits for whole effluent toxicity” (40 C.F.R. § 122.44(d)(1)(v)).

EPA has addressed potential issues in test sensitivity and data reliability between the IC and NOEC approaches. In a guidance document titled “Understanding and Accounting for Method Variability in Whole Effluent Toxicity Applications Under the National Pollutant Discharge Elimination System”, EPA 833-R-00-003, June 2000, EPA provided information on resolving

issues between the NOEC and IC approaches. Item 3.4 - Conclusions about Variability of WET Methods, on page 3-10 states: "In principle, NOEC could be estimated more accurately and precisely by changing the experimental design to use more concentrations at narrower dilution ratios and by using more replicates."

In addition to the measures discussed above, Region 6 WET permitting practices have addressed concerns with the differential uses of NOEC and IC_p data analysis and reliability by the following:

a. NPDES permits establish only the minimum number of effluent concentrations for the test. Permittees concerned about use of hypothesis testing are free to increase the number of effluent concentrations tested as long as they maintain the original test design (e.g., the test design should not be arranged to add two effluent concentration lower than the critical dilutions and none above it. Also, the additional effluent concentrations should be added in pairs, each one being equidistant above or below the critical dilution) to ensure against introducing bias in the analysis of the data. Added appropriately, additional test concentrations and replicates increases the number of organisms tested which can improve statistical reliability. Adding effluent concentrations in an inappropriate manner could skew the test results. For this reason, the effluent dilutions should be 'balanced' around the critical dilution where possible.

b. Region 6 addresses the issue of narrower dilution ratios by using a dilution ratio factor of 0.75, which results in test concentrations being closer together than the 0.5 dilution factor (see the example below). Better resolution around threshold effect concentrations provides better input to mathematical models to predict point estimations of effects and reduce uncertainty in hypothesis tests of effects. Reducing the distance between effluent dilutions also minimizes the need to rely on interpolations of effects between tested concentrations.

Examples of dilution series based on SJRA's critical dilution (78%) using dilution factors 0.3, 0.5 and 0.75 are given below:

0.75 - 100%, 78%, 59%, 44%, 33%

0.50 - 100%, 78%, 40%, 20%, 10%

0.30 - 100%, 78%, 24%, 7%, 2%

In the examples above, both the 100% and 78% effluent concentrations are more likely to be identified as toxic if the test dilution series based on 0.5 or 0.3 is used. Noting the large difference in amount of effluent used in the lower effluent dilutions, one would expect to see less toxicity in the lower effluent concentrations, and the greater the difference, the more likely the higher dilutions (100% and 75%) will appear to be statistically 'different' from the lower ones.

c. With the exception of the *Ceriodaphnia dubia* test, which requires a minimum of ten replicates of each effluent concentration, Region 6 has, since 1995, issued permits that

increase the minimum number of effluent replicates from four to five. Note that these are the minimum numbers of concentration and replicates; permittees may increase the number of concentrations and replicates at their discretion as long as the basic test design is not modified (e.g., should increase the number of replicates for all effluent dilutions and control by the same number; additional effluent concentrations should be equivalently spaced above and below the effluent critical dilution).

d. For chronic testing, Region 6 permits have required reporting of, and adherence to, the percent minimum significant difference (PMSD) variability control as part of the overall test acceptability criteria for sublethal effects determination. Test results that fall outside the PMSD are subject to additional review and censure. This procedure is explained in detail in EPA's guidance document "Understanding and Accounting for Method Variability in Whole Effluent Toxicity Applications Under the National Pollutant Discharge Elimination System", EPA 833-R-00-003, June 2000.

Region 6 implemented the above revisions over a period of several years in order to improve data reliability. However, even without these additional requirements, NOEC testing is supported by EPA's promulgated WET methods for purposes of compliance with NPDES permit limits (see Appendix E).

Mortality, growth and reproduction data are determined after the test and statistically analyzed to assess performance in various effluent concentrations and a non-toxic control. Test failure is indicated where the test meets all test acceptability criteria for performance and the statistical evaluation of raw data indicates a statistically significant difference between survival or reproduction in a non-toxic control and concentrations of effluent that include the effluent instream waste concentration and lower concentrations of effluent. Following its standard practice, as described in §X2.a of this document, the TCEQ has established that the effluent instream waste concentration for this facility is 78%.

Similar to other waste water discharge permits issued by TCEQ and EPA, WET lethal and sub-lethal test results are reported as NOEC values to EPA's Permit Compliance System. The reported test NOECs are used to determine the need (i.e., to calculate reasonable potential) for WET limits, to trigger toxicant source and control studies should toxicity persist, and/or to determine compliance and magnitude of toxicity where the permit includes WET limits. For these reasons, it is important that all test results are reported accurately and reflect the actual test results. Accurate reporting is the responsibility of the permittee. EPA Region 6 has a long history of working with labs and permittees where questions arise about unusual data or data analysis. EPA recommends where there is a concern about test data, the Agency should be contacted in a timely manner for assistance in determining how, or if such data should be reported.

WET Test Design

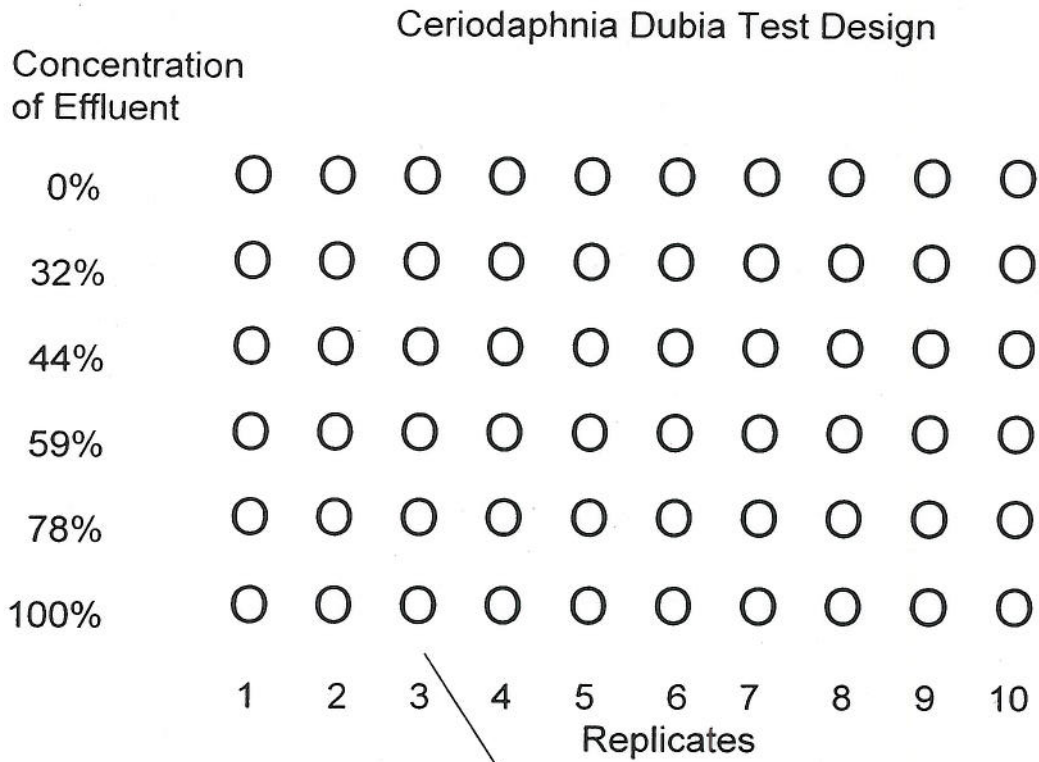
EPA's promulgated chronic freshwater fish and water flea (*Ceriodaphnia dubia*) tests are

designed using a minimum of five effluent concentrations and a non-toxic control. For NOEC testing EPA Region 6 and authorized States within Region 6 have selected effluent dilutions based on the critical dilution (assigned by the State) and a standardized dilution factor to ensure an appropriate 'spread' between the effluent dilutions tested. In the case of SJRA, the critical dilution is 78% and the effluent dilution series proposed in the NPDES permit is 0%, 25%, 33%, 44%, 59%, 78% and 100% effluent. The non-toxic water used for the control is also used to make up the various dilutions of effluent.

For the control and each effluent concentration tested, the promulgated test method requires a minimum number of replicates. Replicates are duplicate test vessels with identical effluent/diluent concentrations and test organisms for each effluent concentration. For example, for each effluent concentration tested, the *Ceriodaphnia dubia* waterflea test requires a minimum of 10 replicates, with one organism and the same concentration of effluent and non-toxic dilution water in each test vessel. Using only one test organism per vessel facilitates counting the number of young produced per organism.

Figure 1 below depicts the design of EPA's *Ceriodaphnia dubia*, Survival and Reproduction Test promulgated in 1995. This test is designed to determine the effect of effluent on the ability of *Ceriodaphnia dubia* to survive and reproduce expressed statistically as an NOEC or IC₂₅. Each circle in Figure 1 represents a test cup with testing solution in it. At the beginning of the test, each cup contains one juvenile female *Ceriodaphnia dubia* less than 24 hours old, and all born within 8 hours of each other. The top row represents the control group, which is exposed only to clean water containing no effluent or toxicants. The experimental groups of test organisms are exposed to the specified concentrations of effluent (in this example, 32%, 44%, 59%, 79% and 92%). At the end of the test (typically seven days) the total offspring produced by each adult in each cup are summed.

Figure 1. Waterflea (*Ceriodaphnia dubia*) Chronic Toxicity Test Design



Each test uses 60 cups and test organisms.

All test cups and organisms are randomly assigned and distributed.

1 adult female waterflea per cup.

Every 24 hours the young are counted and removed.

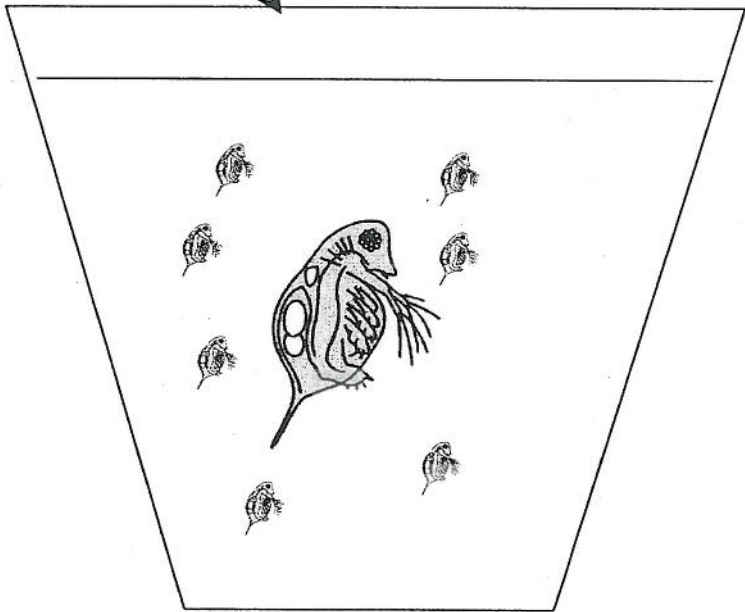


Figure 2, below, provides an example of hypothetical test data collected after the seven-day test period. The results are reported as an average of the number of fleas in each cup, at each effluent level (last column). Each treatment, i.e., effluent dilution, is compared statistically to the control. In this example, even though the average number of *Ceriodaphnia dubia* in each cup declines after exposure to even the lowest concentration of effluent (32%) and declines progressively as the samples are exposed to increasing concentrations of effluent, the test method requires that the results at each concentration be compared to the control using statistical tools before the analyst can make any conclusions about toxicity.

Figure 2. Example reproduction results for *Ceriodaphnia dubia* toxicity test

Concentration of Effluent	<i>Ceriodaphnia dubia</i> Reproduction										Avg. No. Young
	1	2	3	4	5	6	7	8	9	10	
Control (0%)	31	33	29	28	32	31	35	29	30	32	31.0
32%	20	17	23	18	19	21	14	22	21	19	19.4
44%	23	15	16	16	19	15	19	10	13	12	15.8
59%	14	8	11	5	8	17	10	8	7	7	9.5
78%	8	7	7	1	2	9	9	5	4	9	6.0
100%	5	8	2	2	6	3	11	4	2	7	5.0
	1	2	3	4	5	6	7	8	9	10	

Multiexposing not just one organism but, for example, ten organisms to each concentration level of effluent, taking the average of that result, and comparing it to an average based on ten unexposed sets of control organisms – is an integral part of WET test method design. WET test methods using fish or invertebrates typically require the use of 60 to 200 organisms per test. Chemical test methods, in comparison, are based on a single measurement of a sample. The large number of replicates, the use of averaging, and statistical methods account for variability and protect against small changes being interpreted as findings of toxicity.

5. Determination of the Need for WET Limits (“WET Reasonable Potential”) - Evaluation

Pursuant to 40 CFR § 122.44(d)(1)(ii), EPA evaluated the need for the lethal and sub-lethal WET test endpoints. Information submitted by the SJRA to the EPA Permit Compliance System reported numerous test failures for sub-lethal effects in the *Ceriodaphnia dubia* 7-day chronic toxicity test. The duration and magnitude of the effluent’s toxic effects have been significant (See Appendix F -WET Results Charts). The specific data used in the determination of the need for WET limits and the analysis results are presented in Appendix G. EPA Region 6 used its Whole Effluent Toxicity Permitting Strategy, May 2005 (see Appendix D), in evaluating the need for WET limits for this data set. This Region 6 Strategy follows the procedure given in EPA’s Technical Support Document for Water Quality-Based Toxics Control (EPA/505/2-90-001), in Box 3-2 on page 53 and Table 3-2 on page 54. For calculation purposes, the No Observed Effects Concentration (NOEC) values for lethal and sub-lethal effects in tests reported by the permittee were converted to toxic units (TUs). This calculation is 100/NOEC value (e.g., if the NOEC for the sub-lethal endpoint in a test was 78% effluent, then $100 / 78 = 1.3$ TUs).

EPA reviewed all WET test data submitted and found the majority of data to be acceptable, i.e., “valid” (data not used is noted and explained at the bottom of the data analysis spreadsheet presented in Appendix G). SJRA’s effluent demonstrated significant sub-lethal effects in 14 of 59 tests performed over the past five years, with toxicity demonstrated at all effluent concentrations tested (from 86% effluent down to <23% effluent, the lowest effluent concentration tested. When a test failure occurred at that concentration (23%), following established procedures, EPA applied a default value of 22% for the “reasonable potential” calculation, although the true NOEC may have been much lower, i.e., more toxic. The “reasonable potential” calculation for sub-lethal effects to the *Ceriodaphnia dubia* test species produced the following results:

Effluent Critical Dilution = 78% effluent = $100/78 = 1.28$ TU
Lowest NOEC = 22% = 4.55 TU
Coefficient of Variation = 0.6
Standard Deviation = 0.4
Reasonable Potential Multiplying Factor = 1.1
Reasonable Potential Value = 3.95 TU

Because the Reasonable Potential Value exceeds the Effluent Critical Dilution ($3.95 > 1.27$), the need for a WET limit exists based on sub-lethal effects to *Ceriodaphnia dubia*. SJRA’s effluent has actually failed (i.e., been demonstrably toxic) for the sub-lethal test endpoint numerous times at and well below the effluent critical dilution during the previous permit period. This means that EPA determines not only that the discharge has the reasonable potential to cause non-attainment of the narrative criteria for toxicity, but that the discharge will cause non-attainment of the narrative. Reasonable potential is not merely predicted; actual exceedances of the State’s narrative water quality standard for the protection of aquatic life have already occurred. It is reasonable to expect that, left uncontrolled; effluent from this facility will continue to cause or