PERMITTING GUIDANCE DOCUMENT FOR IMPLEMENTING LOUISIANA SURFACE WATER QUALITY STANDARDS WATER QUALITY MANAGEMENT PLAN VOLUME 3

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VERSION 9

LOUISIANA DEPARTMENT OF ENVIRONMENTAL QUALITY
LDEQ OFFICE OF ENVIRONMENTAL SERVICES

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1. Introduction

The Louisiana Department of Environmental Quality (LDEQ) through its Office of Environmental Assessment administers and reviews the Louisiana Surface Water Quality Standards as Title 33 Louisiana Administrative Code, Part IX, Chapter 11. The Office of Environmental Services is also charged with the responsibility of maintaining and enhancing the waters of the State through the permit process. This document establishes procedures to effectively incorporate the water quality standards into wastewater discharge permits. Although all applications for permits to discharge wastewaters are considered on a case-by-case basis, the LDEQ believes that a consistent approach to application reviews is important. A permit applicant may provide information and data throughout the technical review period, additional to that required by the Secretary, to assist the LDEQ staff in the site-specific assessment and draft permit development. All preliminary determinations by the LDEQ staff in the development of a permit - including designated uses, reasonable potential analysis, antidegradation, effluent limitations, and all other requirements of the permit - are subject to additional review and revisions through the public review/hearing process.

2. Application of Numerical Standards and Use Attainability

Numerical criteria as specified in LAC 33:IX.1113.C will be applied for the appropriate designated water use(s) on each water body. Both aquatic life and human health criteria as specified in LAC 33:IX.1113.C. will be reviewed and the most stringent applied for the corresponding designated use on each water body. In cases where no numerical criteria are specified, regulation of toxic substances will follow LAC 33:IX.1121. The appropriate criteria will be applied to the specified waterbodies and to their tributaries, distributaries, and interconnected streams and water bodies if they are not specifically named, unless it can be shown through a use attainability analysis that unique chemical, physical, and/or biological conditions indicate that the uses designated are not appropriate and/or that site-specific criteria based on appropriate uses can be developed. Those water bodies designated as intermittent streams, man-made watercourses, naturally dystrophic waters, wetlands, or waterbodies with site-specific criteria may be excluded from some numerical criteria as specified in LAC 33:IX.1123 and/or LAC 33:IX.1113.C.

Numerical criteria applied to named water bodies to specifically protect their use as drinking water supplies, oyster propagation, or outstanding natural resource waters will not apply to tributaries and distributaries of these water bodies unless so specified. In addition, the variance procedure specified in LAC 33:IX.1109.E may be used to temporarily suspend criteria or to provide time to research site-specific criteria on a case-by-case basis.

3. Application of Metals Criteria

A conversion mechanism to translate dissolved metals to total metals has been developed since most LPDES permits state their metals in terms of total, not dissolved.

Metals criteria for aquatic life protection are based on dissolved metals concentrations in ambient waters. They are a function of hardness ($CaCO_3$), which typically will be obtained from average two-year data compilations contained in the latest Louisiana Water Quality Data Summary (Units in mg/L), USGS data, or other data sources. However, other comparable data compilations or reports or water body specific data provided by the applicant may be considered. The minimum hardness shall be 25 mg/L and the maximum hardness shall be 400 mg/L used in hardness dependent metal criteria calculations in accordance with 40 CFR 131.36(c)(4)(i). Effluent hardness may be used in determining the hardness of the receiving waters on a case-by-case basis. An applicable example would be an effluent dominated stream. An effluent dominated stream, for the purposes of this discussion, would be defined as a stream containing at least 50% or more effluent (maximum 30 day flow) during critical conditions. The LDEQ will implement a dissolved-total metal conversion detailed below. This involves determining a linear partition coefficient for the metal of concern and using this to determine the fraction of metal dissolved, so that the dissolved metal ambient criteria may be translated to a total effluent limit.

The formula for streams and lakes is as follows:

$$K_p = K_{po} * TSS^{\alpha}$$

K_p = Linear partition coefficient
TSS = suspended solids concentration receiving stream, units in mg/L, lowest 15th percentile, (two-year data set)
K_{po} = found from Table 1 below
α = found from Table 1 below

$\frac{C_D}{C_T}$ = Fraction of metal dissolved

$$\frac{C_D}{C_T} = \frac{1}{1 + (K_p * TSS * 10^{-6})}$$

C_r = Dissolved Criteria value for metal in water quality standards

Total Metal = $C_r = \frac{C_D}{C_T}$

Table 1. Linear Partition Coefficients for Priority Metals in Streams and Lakes (Delos, et al., 1984).[1]

Metal	Streams		Lakes	
	K_{po}	α	K_{po}	α
Arsenic	0.48×10^6	-0.73	0.48×10^6	-0.73
Cadmium	4.00×10^6	-1.13	3.52×10^6	-0.92
Chromium III[2]	3.36×10^6	-0.93	2.17×10^6	-0.27
Copper	1.04×10^6	-0.74	2.85×10^6	-0.90
Lead[3]	2.80×10^6	-0.8	2.04×10^6	-0.53
Mercury	2.90×10^6	-1.14	1.97×10^6	-1.17
Nickel	0.49×10^6	-0.57	2.21×10^6	-0.76
Zinc	1.25×10^6	-0.70	3.34×10^6	-0.68

[1] Delos, C. G., W. L. Richardson, J. V. DePinto, R. B. Ambrose, P. W. Rogers, K. Rygwelski, J. P. St. John, W. J. Shaughnessy, T. A. Faha, W. N. Christie. Technical Guidance for performing Waste Load Allocations. Book II: Streams and Rivers. Chapter 3: Toxic Substances, For the U.S. Environmental Protection Agency. (EPA-440/4-84-022)

[2] Linear partition coefficients shall not apply to the Chromium VI numerical criterion. The approved analytical method for Chromium VI measures only the dissolved form. Therefore, permit limits for Chromium VI shall be expressed in the dissolved form. See 40 CFR § 122.45(c)(3).

[3] "Guidance on Interpretation and Implementation of Aquatic Life Criteria for Metals", February, 1992, Health and Ecological Criteria Division, Office of Science and Technology, U.S. Environmental Protection Agency.

In lieu of a Louisiana site-specific model, the formula for Texas estuaries has been adopted for Louisiana estuaries:

$$K_D = 10^b * TSS^m$$

K_D = Linear partition coefficient
TSS = suspended solids concentration, lowest 15^{th} percentile, receiving stream. Units are in mg/L.
b = Intercept, found from Table 2 below
m = Slope, found from Table 2 below

C_r = Dissolved Criteria value for metal in water quality standards
$\frac{C_D}{C_T}$ = Fraction of metal dissolved

$$\frac{C_D}{C_T} = \frac{1}{1 + \frac{(K_D * TSS)}{(1 * 10^6)}}$$

Total Metal = $C_r/(C_D/C_T)$

Table 2. Linear Partition Coefficients for Priority Metals in Estuaries (Benoit and Santschi, 1991).[1]

Metal	Intercept (b)	Slope (m)
Copper	4.86	-0.72
Lead	6.06	-0.85
Zinc	5.36	-0.52

[1] Benoit, G. and Santschi, P. H., 1991. Trace Metals in Texas Estuaries. Prepared for the Texas Chemical Council. Texas A & M University at Galveston, Department of Marine Sciences.

The only site-specific input into the models is the lowest 15th percentile TSS data from the sub-segment or nearest sub-segment receiving waterbody as indicated in the Water Quality Management Plan, Louisiana Water Quality Data Summary.

The LDEQ will determine the lowest 15th percentile TSS values using data from the Water Quality Data Summary, USGS data or other data sources in lieu of site-specific data. The permittee may supply site-specific lowest 15th percentile TSS (mg/L) and 2 year hardness (as $CaCO_3$) (mg/L) data (minimum 2 year data set with a 1/month monitoring frequency) included <u>with the facility's application</u> if the permittee wants site-specific consideration. Effluent TSS may be used in determining the TSS of the receiving waters on a case-by-case basis. An applicable example would be an effluent dominated stream. An effluent dominated stream, for the purposes of this discussion, would be defined as stream containing at least 50% or more effluent (maximum 30-day flow) during critical flow events.

If there is no partition coefficient listed for a metal in question, then dissolved to total ratio (C_d/C_t) shall equal 1. The metal will be evaluated as if the dissolved concentration equals the total recoverable concentration. A compliance schedule may be established for a period of up to 3 years. Monitoring requirements or appropriate technology based effluent limitations established pursuant to 40 CFR § 122.44 (a) will be established during the interim period. The permittee may develop a site-specific linear partition coefficient during the interim period. A water quality reopener clause may be placed in the permit to allow for a permit modification using a site-specific linear partition coefficient for the metal of concern.

4. Mixing Zone and Related Flows

A. General permitting applications:

Acute aquatic life toxicity numerical criteria shall be applied at the edge of the zone of initial dilution (ZID). Chronic aquatic life toxicity numerical criteria shall be applied at the edge of the mixing zone (MZ). Human health criteria are to be met below the point of discharge after complete mixing. No mixing zones or fractions of flow shall apply to human health criteria. For aquatic life waterbody categories 1 through 4, the fractions of critical flow listed in LAC:33:IX.1115, Table 2a will be used. For human health waterbody categories 1 through 3, the appropriate flow listed in LAC:33.IX.1115, Table 2b will be used. For aquatic life waterbody categories 5 through 7, the radial distances listed in LAC:33:IX.1115, Table 2a will be used. For human health waterbody categories 4 through 6, the mixing conditions will be determined on a case-by-case basis.

The LDEQ Office of Environmental Services will normally make use of the following to calculate water quality based limits:

1. The maximum 30-day average flow for the last 2 years for industrial dischargers;

2. The design flow or other flow information as supported by federal rule for designated POTWs;

3. The expected flow, for other treatment works treating domestic sewage which are not designated POTW's based upon (a) the most recent "Sewage Loading Guidelines", Appendix B, Chapter XIII of the State of Louisiana Sanitary Code or (b) other applicable data approved by the Department.

B. Man-made water courses:

Where available, site-specific critical flow and harmonic mean flow will be applied to man-made water courses. In the absence of site-specific flow data, LDEQ shall consider each situation on a case-by-case basis.

The uses designated for the man-made watercourse may determine whether the flow used should be that of the man-made watercourse or that of the next downstream waterbody. Uses that are not designated for the man-made watercourse will be protected in the next downstream waterbody.

C. Critical Flow and Harmonic Mean Flow Determinations

Tidal Flows

The tidal flow algorithm as used by LDEQ uses the "tidal prism" principle, with inputs of (1) the affected surface area (upstream of the point at which the determination is made), (2) the tidal range, and (3) the period of elapsed time covered by the tidal range to determine the "average or typical flow averaged over one tidal cycle".

1. Determine the surface area upstream of the discharge point affected by the tidal range that will be determined in the computation (See Item 2 below).

2. Determine the typical tidal range (in feet) that affects the surface discussed in Item 1 above. The range is the vertical distance between "high" and "low" tide elevations and occurs in one-half of the tidal cycle.

3. Multiply the surface area by the tidal range to determine the volume of water stored (or released from storage) during the tidal half-cycle. The unit of volume is the cubic foot.

4. Divide the volume calculated in Item 3 by the number of seconds in the tidal half-cycle. The result (in cubic feet per second) is defined as the average discharge necessary to store (or release) this computed volume of water in the time defined by the tidal half-cycle. This is the "average or typical flow averaged over one tidal cycle."

5. The average discharge computed in Item 4 is then divided by three to arrive at the "critical flow" used to determine effluent limits for aquatic life criteria. Effluent limits for human health criteria shall be calculated using the average flow calculated in Item 4.

Low Flow Calculations

LDEQ typically uses Technical Report 70 "Low-Flow Characteristics of Louisiana Stream" as published in 2003 to obtain the 7Q10 at selected continuous-record and partial record gaging stations. LDEQ also computes 7Q10 values at gaged stations based on average daily flow data obtained from the USGS. DFLOW (originated by EPA) or EXCEL may be used to perform the calculations.

DEQ uses the following protocol to determine the 7Q10 at ungaged sites.
Use of Technical Report 75 "**Analysis of the Low-Flow Characteristics of Streams in Louisiana**" is recommended. Equations used require the determination of:

1. Drainage Area, (DA), in square miles,
2. Annual Precipitation, (P), in inches per year,
3. Channel Slope, (S), between the 10% and 85% main channel length, in feet per mile.

The Annual Precipitation is determined from a map contained in TR-75. Maps with updated rainfall information may be used. Drainage area and channel slope can be measured from 7-1/2 minute quadrangle maps.

For region 1 as delineated in TR-75:

$$7Q10 = -7.1 + 0.0072 \times DA + 5.5 \times S^{0.093};$$

For region 2 as delineated in TR-75:

$$7Q10 = 0.0015 \times DA^{1.11} \times S^{0.63} \times (P-50)^{1.17}:$$

For region 3 as delineated in TR-75:

$$7Q10 = 1.6E\text{-}5 \times DA^{1.58} \times S^{2.31};$$

where the 7Q10 is defined as "the discharge for 10-year recurrence interval taken from a frequency curve of annual values of the lowest mean discharge for 7 consecutive days, in cubic feet per second (cfs) and DA, P, S, have been previously defined.

Region 4 has no developed equations. Many of the streams in these areas either go dry during the year or go stagnant with no discernable flow. At streams in this area where there is no measured stream flow, a good estimate of the 7Q10 is zero.

Another method that can be employed is to use a drainage area ratio. The 7Q10 at a gaged site can be transferred to a nearby stream by taking the ratio of the two drainage areas and multiplying it by the known 7Q10 at the gaged site. The two streams should be in the same hydrologic region. This method has less certainty than using the equations.

Use of either method must be taken with caution. The relationship between the 7Q10 and basin characteristics is very hard to define and the equations presented are only estimates. There can be a high degree of variability.

In cases where the critical flow is less than or equal to 0.1 cfs, 0.1 cfs shall be the default critical flow for streams not designated intermittent at LAC 33.IX.1123, Table 3.

Harmonic Mean Flow

Harmonic Mean Flow (HMF) will be computed using either DFLOW or EXCEL and the average daily flow data obtained from the USGS. The HMF may be used directly if the discharge outfall site is on the same stream and near the streamflow station; the HMF for the outfall site may be estimated on the basis of relative drainage area if the discharge station site is upstream or downstream of the outfall site. If the outfall site is on a different stream, the HMF will be estimated on the basis of relative drainage area (a flow per square mile) if the two stream basins can be said to be hydrologically similar (shape, soils, elevations, rainfall, vegetation, cultural features, etc.) Use of a drainage area basis is considered technically feasible because the average flow events (arithmetic mean, harmonic mean) are strongly associated with rainfall events and the surface area exposed to those events. To avoid gross errors, good judgement is called for in ascribing "likeness" to the two basins. In cases where the harmonic mean flow is less than or equal to 1 cfs, 1 cfs shall be the default harmonic mean flow for streams not designated intermittent at LAC 33.IX.1123, Table 3.

D. Prevention of Impacts from Overlapping Mixing Zones

To assure that water uses are not impaired due to effluent mixing in areas of drinking water intakes and overlapping mixing zones, LDEQ has in place a variety of assessment programs. On a biennial basis for the Section 305(b) Water Quality Inventory, LDEQ reviews available water quality data to prepare a list of impaired waterbodies as required under Section 303(d). Those waterbodies identified on the 303(d) list are further evaluated and screened for the source of impairment and whether they are due to overlapping mixing zones. In addition to this effort, LDEQ takes the following steps to insure the protection of drinking water intakes:

1. Permit writer will consider proximal point source dischargers and drinking water intakes during permit development.

2. LDEQ will acquire information from the Louisiana Department of Health (LDH), Safe Drinking Water Program Section, regarding exceedances of maximum contaminant levels (MCLs) in surface drinking water supplies. This information will be summarized in the biennial Water Quality Inventory [305(b) Report]. Monthly ambient monitoring data for organic pollutants collected on the Mississippi River will also be assessed to determine whether impairment of water quality or uses is occurring.

3. If a water quality problem in a waterbody and/or at a drinking water supply is identified, the discharger's effluent data will be examined to determine whether the pollutant causing the criteria exceedance is discharged by the permittee.

4. If a use impairment is suspected, the Engineering Section will conduct a site-specific study to determine the degree of impact resulting from the discharger.

5. Establishing Permit Limits

LDEQ will require water quality based limits as appropriate for pollutants that are present in the discharge as determined by appropriate sampling or are involved in the manufacturing process. The LDEQ will consider effluent variability in the derivation of permit limits using EPA's Technical Support Document[1] (TSD) procedures.

A. Limit Derivation

This derivation process applies to all pollutants where chronic aquatic life criteria are to be met at the edge of the mixing zone (MZ), acute aquatic life criteria are to be met at the edge of the zone of initial dilution (ZID), and human health criteria are to be met below the point of discharge after complete mixing (LAC 33:IX.1115.C). Freshwater aquatic criteria will be used for waters with average ambient salinity less than 2,000 parts per million (ppm). Marine aquatic criteria will be used for waters with average ambient salinity greater than or equal to 10,000 ppm. In areas of brackish water (defined in LAC 33:IX.1105), the applicable criteria are the more stringent of the freshwater or marine criteria, as described in LAC 33:IX.1113.C.6.b and d. Total Maximum Daily Load (TMDL) type WLAs shall be used in lieu of a site-specific dilution (Complete Mix Balance Model, Fischer Model, etc.) type WLAs as they are developed. TMDL type WLAs account for all known and unknown sources of a pollutant with each known source receiving a certain fraction of the TMDL. TMDL and respective WLA calculation procedures shall be in accordance with "Louisiana Total Maximum Daily Load Technical Procedures". The Louisiana technical procedures document follows EPA protocol expressed in the document, "Guidance for Water Quality-Based Decisions: The TMDL Process", EPA 440/4-91-001 to the extent that is appropriate for Louisiana's hydrologic conditions. Intermittent discharges will be handled on a best professional judgement basis.

Complete Mix Balance Model for Waste Load Allocation and Critical Dilution:

Dilutions at the edge of the Mixing Zone (MZ), the Zone of Initial Dilution (ZID), after complete mixing using harmonic mean and full 7Q10 flow (no fraction of flow), and allowable effluent concentrations at End of Pipe (EOP) for waterbody categories 1, 2, 3, and 4 (LAC 33:IX.1115, Tables 2a and for waterbody categories 1, 2, and 3 (LAC 33:IX.1115, Table 2b.) are typically calculated using the Complete Mix Balance Model. However, other dilution models may be used as appropriate upon agreement by LDEQ and EPA Region 6, Water Management Division:

Formulas:

$$Dilution\ Factor = \frac{Q_e}{(Qr_a, Qr_{hhnc}, Qf_{hhc}) * F_S + Q_e}$$

$$WLA = \frac{C_r}{Dilution\ Factor} - (F_S * [Qr_a, Qr_{hhnc}, Qr_{hhc}] * \frac{C_u}{Q_e}$$

Q_e = Plant effluent in MGD.
$Qr_a, Qr_{hhnc}, Qr_{hhc}$ = Critical flow or harmonic mean flow of receiving stream, MGD, LAC 33:IX.1115, Tables 2a and 2b.

- Qr_a is the critical flow (7Q10) of the receiving stream that applies to aquatic life numerical criteria. Mixing zones and fractions of flow shall apply.
- Qr_{hhnc} is the 7Q10 of the receiving stream that applies to human health non-carcinogen numerical criteria. Fractions of flow shall not apply.

[1] Technical Support Document for Water Quality-based Toxics Control, EPA Pub. No. 505/2-90-001, PB91-127415, March 1991.

- Qr_{hhc} is the harmonic mean flow of the receiving stream that applies to Human Health carcinogens. Fractions of flow shall not apply.

F_s = MZ, ZID flow fraction, LAC 33:IX.1115, Table 2a. For Human Health criteria (carcinogens and non-carcinogens), F_s is always assumed to be 1.

C_r = Numerical criteria value from LAC 33:IX.1113, Table 1 (toxics).

C_u = Ambient instream concentration for pollutant. In the absence of accurate supporting data, assume C_u = 0 unless the receiving waterbody is impaired. If the receiving waterbody is impaired, LDEQ shall follow procedures outlined in Appendix G.

WLA= Concentration for pollutant at end-of-pipe based on Aquatic Life and Human Health numerical criteria (site specific dilution type).

If the calculated value of WLA is less than or equal to zero, then WLA shall equal zero.

<u>Fischer Model for Waste Load Allocation and Critical Dilution:</u>

The Fischer model for pipe discharges (the simple model outlined on page 328 of "Mixing in Inland and Coastal Waters") and the Fischer variation for canals will be used for dilution calculations for aquatic life waterbody categories 5, 6, and 7 (LAC 33:IX.1115, Table 2a) in the absence of site-specific data or until a model is developed specifically for Louisiana. If the applicant can provide site-specific data, this data may be used in lieu of the Fischer model. For human health waterbody categories 4, 5, and 6 (LAC 33:IX.1115, Table 2b), mixing conditions will be determined on a case-by-case basis.

Formulas:

Discharge from a pipe:

$$Critical\ Dilution = \frac{2.8 * P_w * \pi^{1/2}}{P_f}$$

$$WLA = \frac{(C_r - C_u)P_f}{2.8 * P_w * \pi^{1/2}}$$

Discharge from a canal:

$$Critical\ Dilution = \frac{2.38 * {P_w}^{1/2}}{{P_f}^{1/2}}$$

$$WLA = \frac{(C_r - C_u){P_f}^{1/2}}{2.38 * {P_w}^{1/2}}$$

P_f = Allowable plume distance in feet, specified in LAC 33.IX.1115, Table 2a, for aquatic life criteria. Allowable plume distance for human health criteria shall be determined on a case-by-case basis.

P_w = Pipe width or canal width in feet

C_r = Numerical criteria value from LAC 33:IX.1113, Table 1 (toxics).

C_u = Ambient instream concentration for pollutant. In the absence of accurate supporting data, assume C_u = 0 unless the receiving waterbody is impaired. If the receiving waterbody is impaired, LDEQ shall follow procedures outlined in Appendix G.

WLA= Concentration for pollutant at end-of-pipe based on aquatic life and human health numerical criteria (site specific dilution type)

For C_r, WLA, and C_u, keep units consistent, i.e., if C_r is in µg/L then WLA, LTA, and C_u will be in µg/L.

The following individual WLAs (either site-specific dilution or TMDL type) are converted to long term averages (LTA) and permit limits using multipliers derived below (Derivation of Multipliers) based on TSD procedures:

WLA_a (ZID, acute allowable effluent concentration, EOP)
WLA_c (MZ, chronic allowable effluent concentration, EOP)
WLA_h (human health allowable effluent concentration, EOP)

1) Derivation of Multipliers for Calculating Long Term Average (LTA) and Permit Limits:

Assumptions	Basis
n_1 = 4 day averaging period for chronic LTA.	Based on TSD recommendations in Chapter 2 section 2.3.4, Duration for Single Chemicals and Whole Effluent Toxicity, and Appendix C.
CV = 0.6	Based on TSD recommendations, Chapter 5, section 5.5.2, Coefficient of Variation, and Appendix A.
Z_1 = 2.326, 99% probability basis for WLA → LTA and LTA→ Daily Max	Based on effluent discharge from a treatment system fitting a lognormal distribution (See sections 5.2.2, 5.3.1, and Appendix E).
Z_2 = 1.645, 95% probability LTA → Daily Avg	99% and 95% probabilities selected on the basis of recommendations in Chapter 5, section 5.5.4 in the TSD.
n_2 = 12 samples per month	12 was selected on the basis of the 3/week monitoring frequency policy for pollutants of concern in major permits.

Multiplier Calculations for all waterbodies:

Derivation of LTA:

a) 99%, Acute (LTA_a):

$$LTA_a = WLA_a * e^{\left[\{0.5*\ln(CV^2+1)\}-Z_1\{\ln(CV^2+1)\}^{1/2}\right]}$$

$$LTA_a = WLA_a * e^{\left[\{0.5*\ln(0.6^2+1)\}-2.326\{\ln(0.6^2+1)\}^{1/2}\right]}$$

$$LTA_a = WLA_a * 0.3211$$

b) 99%, Chronic (LTA_c):

$$LTA_c = WLA_c * e^{\left[\left\{0.5*\ln\left(\frac{CV^2}{n_1}+1\right)\right\}-Z_1\left\{\ln(\frac{CV^2}{n_1}+1)\right\}^{1/2}\right]}$$

$$LTA_c = WLA_c * e^{\left[\left\{0.5*\ln\left(\frac{0.6^2}{4}+1\right)\right\}-2.326\left\{\ln(\frac{0.6^2}{4}+1)\right\}^{1/2}\right]}$$

$$LTA_c = WLA_c * 0.5274$$

c) Human Health (LTA_h):

$$LTA_h = WLA_h = \text{Maximum 30-Day Value}$$

Therefore, LTA multipliers for Louisiana Waterbodies:

$LTA_a = WLA_a \times 0.32$
$LTA_c = WLA_c \times 0.53$
$LTA_h = WLA_h$

2) <u>Conversion of LTA into Permit Limits:</u>

a) 12 samples, 99% Daily Maximum:

$$Daily\ Maximum = LTA * e^{\left[Z_1\{\ln(CV^2+1)\}^{1/2} - 0.5*\ln(CV^2+1)\right]}$$

$$Daily\ Maximum = LTA * e^{\left[2.326\{\ln(0.6^2+1)\}^{\frac{1}{2}} - 0.5*\ln(0.6^2+1)\right]}$$

$$Daily\ Maximum = LTA * 3.114$$

b) 12 samples, 95% Maximum 30-Day Value:

$$\text{Maximum 30-Day Value} = LTA * e^{\left[Z_2\left\{\ln(\frac{CV^2}{n_2}+1)\right\}^{1/2} - \left\{0.5*\ln\left(\frac{CV^2}{n_2}+1\right)\right\}\right]}$$

$$\text{Maximum 30-Day Value} = LTA * e^{\left[1.645\left\{\ln(\frac{0.6^2}{12}+1)\right\}^{1/2} - \left\{0.5*\ln\left(\frac{0.6^2}{12}+1\right)\right\}\right]}$$

$$\text{Maximum 30-Day Value} = LTA * 1.307$$

c) 12 samples, 99% Human Health:

$$\text{Maximum 30-Day Value} = \text{WLA} = \text{LTA}$$

$$\text{Daily Maximum} = \text{Max 30-Day} * \frac{e^{\left[Z_1*(ln\{CV^2+1\})^{\frac{1}{2}} - 0.5*\ln(CV^2+1)\right]}}{e^{\left[Z_2*\left(ln\left\{\frac{CV^2}{n_2}+1\right\}\right)^{\frac{1}{2}} - 0.5*ln\left\{\frac{CV^2}{n_2}+1\right\}\right]}}$$

$$\text{Daily Maximum} = \text{Max 30-Day} * \frac{e^{\left[2.326*(ln\{0.6^2+1\})^{\frac{1}{2}} - 0.5*\ln(0.6^2+1)\right]}}{e^{\left[1.645*\left(ln\left\{\frac{0.6^2}{12}+1\right\}\right)^{\frac{1}{2}} - 0.5*ln\left\{\frac{0.6^2}{12}+1\right\}\right]}}$$

$$\text{Daily Maximum} = \text{Max 30-Day} * \frac{3.114}{1.307}$$

$$\text{Daily Maximum} = \text{Max 30-Day} * 2.38$$

3) Select the most limiting LTA to derive permit limits (Water Quality Based Limits, (WQBLs)):

If aquatic life LTA is more limiting:

Daily Maximum = Min[LTA_a, LTA_c] * 3.11
Maximum 30-Day Value = Min[LTA_a, LTA_c] * 1.31

If human health LTA is more limiting:

Daily Maximum = LTA_h * 2.38
Maximum 30-Day Value = LTA_h

The resulting allowable effluent concentration is converted into a mass value using the following formula:

Daily Maximum concentration and Maximum 30-Day concentration are converted to lbs/day. Concentration units are in mg/L, flow units are in MGD, and mass unit are in lbs/day.

Daily Maximum concentration * Q_e * 8.34 = Daily Maximum mass
Maximum 30-Day concentration * Q_e * 8.34 = Maximum 30-Day mass

This represents the total water quality based mass limit available to the facility for discharge.

The basis for the assumptions used in the derivation of these multipliers is the Technical Support Document, as stated above. Other coefficients of variation, monitoring frequencies, and probability bases may be considered on a site-specific basis by LDEQ. The burden of demonstrating that such other bases are more appropriate for the facility's discharges lies with the applicant.

B. <u>Determining the need for Water Quality Based Limits:</u>

1) Screen against technology-based limits

If technology-based limits are present for the pollutant being screened then the calculated technology-based mass limits are screened against the calculated effluent water quality based mass limits. The screen is conducted for both maximum 30-day and daily maximum values. For example, it is possible to have a monthly or weekly (for POTWs) average effluent WQBL and a daily maximum technology-based limit for the same pollutant.

If the screen indicates that an effluent WQBL is more limiting than the technology-based limit for a particular pollutant, then that effluent WQBL shall be placed in the permit (40 CFR § 122.44.(d)). However, if the applicant indicates that the pollutant is not involved in manufacturing processes at the facility, reduced monitoring frequencies shall be considered.

2) Screen against EOP values; no technology-based limits present for the pollutant being screened:

The LDEQ will adopt the policy set forth at EPA Region 6 regarding "reasonable potential" for a pollutant to exceed a water quality standard as expressed in a letter dated October 8, 1991 from Jack Ferguson, EPA Region 6 to Jesse Chang, LDEQ. See Appendix A with accompanying attachment. The estimate of the upper range of concentration or mass average EOP values has been set at the 95th percentile using the lognormal distribution. If the estimated 95th percentile of a data set for a pollutant exceeds the calculated effluent daily average WQBL, then effluent WQBLs shall be placed in the permit. The estimate of the 95th percentile is obtained by the following relationship:

average pollutant concentration or mass end-of-pipe (EOP) * 2.13 = 95th percentile average pollutant concentration or mass.

A single measurement of pollutant concentration/mass or the geometric mean of multiple measurements (≤10) may be used to estimate the upper range value (95th percentile). The 95th percentile may be calculated directly from the data set if the data set contains greater than 20 values. Any single measurement or group of measurements with values reported below the MQL shall be treated as a zero value, see section 7, Threshold Reporting. If a data set contains a mix of values that are both above and below the MQL, the values that are below the MQL will be assumed to be present at a value of 50% of the MQL, unless specifically stated in the application. If the geometric mean(s) are not readily available or supplied with the application, the arithmetic mean(s) may be substituted for the geometric mean.

3) Deriving effluent WQBLs in nonattainment waters

a) STREAM BACKGROUND CONCENTRATIONS EXCEED WATER QUALITY STANDARDS

Where the stream background pollutant concentrations exceed the water quality standard(s) at the point of application (chronic mixing zone, zone of initial dilution, or human health mixing zone), the LDEQ shall initiate the development of a TMDL, as time and resources permit, for the receiving stream. However, until the development of a TMDL, the LDEQ shall follow procedures outlined in Section 3 of Appendix G. A permit reopener clause shall be included in the permit to incorporate the results of the TMDL.

b) STREAM BACKGROUND CONTRIBUTIONS PLUS DISCHARGE CONTRIBUTIONS CAUSE EXCEEDANCE OF WATER QUALITY STANDARDS

Where the stream background pollutant mass contributions plus discharge pollutant mass contributions result in an exceedance of the water quality standard(s) at the point of application (chronic mixing zone, zone of initial dilution, or human health mixing zone), the LDEQ shall initiate the development of a TMDL, as time and resources permit, for the receiving stream. However, until the development of a TMDL, the LDEQ shall follow procedures outlined in Section 3 of Appendix G. A permit reopener clause shall be included in the permit to incorporate the results of the TMDL.

C. Permit Limit Units; Mass and Concentration

Permit limit units shall be established in accordance with 40 CFR § 122.45(f).

D. Examples

Numerical examples are included in Appendix D.

6. Sampling Frequency

As a matter of policy, the minimum sampling frequency will generally be set at the number of samples needed for adequate monitoring of overall treatment system performance (toxic, conventional, and nonconventional pollutants) with respect to the contaminants of primary concern and the parameters that are reflective of the adequacy of treatment system performance. Generally, this will be a minimum of once per week for chemical specific water quality based parameters. For contaminants which are not expected to be discharged, the sampling frequency may be less; e.g., for those priority pollutants that are not being discharged by an Organic Chemicals Plastics and Synthetic Fibers (OCPSF) facility, the sampling frequency will generally be set at once per year. In making the final determination, LDEQ will consider characteristics of the treatment system, effluent, the receiving stream, detection limits, and factors unique to sampling including analytical methods and turnaround time. For example, quarterly sampling is determined appropriate for dioxin considering that current analysis (EPA method 1613) for dioxin is time consuming with laboratory turnaround time typically exceeding six (6) weeks. The regulated community is encouraged to provide the LDEQ, at the time of permit application, data on those contaminants not expected or expected only infrequently in a facility's discharge.

7. Threshold Reporting

The LDEQ will generally implement Minimum Analytical Quantification Levels (MQLs) that are currently being used by EPA Region VI for detection limits. See Appendix B. However, the specified MQLs in Appendix B are subject to change. Using more sensitive analytical test methods, the LDEQ may impose permittee effluent-specific MQL values lower than the listed MQL values in Appendix B for discharges to receiving streams with known water quality problems or for discharges to receiving streams where numerical criteria may be exceeded.

The permittee may develop an effluent specific method detection limit (MDL) in accordance with Appendix B to 40 CFR Part 136. For any pollutant for which the permittee determines an effluent specific MDL, the permittee shall send to EPA Region 6 and the LDEQ a report containing QA/QC documentation, analytical results, and calculations necessary to demonstrate that the effluent specific MDL was correctly calculated. An effluent specific minimum quantification level (MQL) shall be determined in accordance with the following calculation:

$$MQL = 3.3 \times MDL$$

Upon written approval by EPA Region 6 and the LDEQ, the effluent specific MQL may be utilized by the permittee for all future Discharge Monitoring Report (DMR) calculations and reporting requirements.

All effluent testing shall be conducted utilizing EPA-approved methods from laboratories accredited to conduct the required analyses.

For Limited Parameters:

In accordance with 40 CFR 122.44(i)(1)(iv), the permittee is required to use the most sufficiently sensitive method necessary to prove compliance with the effluent limitations. For a given parameter, if the MQL prescribed by the permit is less than the permit limitation, any EPA-approved method with a method detection level (MDL) which is equal to or less than this MQL may be utilized. In this scenario, if an individual analytical result is below the MQL, the permittee may report “0” on a discharge monitoring report (DMR).

When the MQL prescribed by the permit is greater than the permit limitation, the permittee shall use a sufficiently sensitive EPA-approved method capable of yielding a quantifiable result which proves compliance with the limitation. If a sufficiently sensitive method is available with an MDL equal to or less than the permit limit, and the individual analytical result is less than the MDL, the permittee may report “0” on a DMR. However, some instances may occur when there is no sufficiently sensitive EPA-approved method which will yield a quantifiable result equal to or less than the permit limitation. In these cases, the permittee must submit supporting documentation indicating that they used the most sensitive method available In this scenario, if an individual analytical result is not detectable at the MDL of the method used, the permittee must report “non-detect” on the DMR. Please note than ANY quantifiable result above the permit limitation shall be reported as an excursion.

For Report Only Parameters:

In accordance with 40 CFR 122.44(i)(1)(iv)(2), the permittee is required to use the most sufficiently sensitive method to quantify the presence of a pollutant. Therefore, the permittee must select a method with an MDL that is at or below the water quality criterion (if applicable) or the MQL, whichever is less. Please be advised that should a sufficiently sensitive method not be available, the permittee must submit supporting documentation stating this.

For reporting purposes, if the most sensitive method is greater than the more stringent of the MQL or the water quality criteria, and the analytical result is less than the MDL, "non-detect" shall be reported on the DMR. If the method is less than or equal to the more stringent of the MQL or water quality criteria and the analytical result is less than that value, zero (0) shall be reported on the DMR.

8. Biological Toxicity Testing

The LDEQ Office of Environmental Services will utilize the most current LDEQ and EPA agreed biomonitoring protocols.

The Clean Water Act and federal regulations at 40 CFR § 122.44(d)(1) establish the basis for whole effluent toxicity (WET), or biomonitoring requirements for wastewater discharge permits issued under the NPDES and LPDES permitting programs. The applicable federal and state regulations require that the permitting authority determine, during the permit development period, whether the reasonable potential exists for an effluent to cause or contribute to an excursion above a State's narrative or numeric criterion for the protection of aquatic life. As per LAC 33:IX.2707.D.1.e and/or 40 CFR § 122.44(d)(1)(v), "...When the permitting authority determines, using procedures in LAC 33:IX.2707.D.1.b [and/or 40 CFR § 122.44(d)(1)(ii)], toxicity testing data, or other information, that a discharge causes, has the reasonable potential to cause or contribute 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." A WET limit is a permit control required where the reasonable potential exists for an exceedance of the State water quality criteria for protection of aquatic life and a specific toxicant(s) has not been identified and controlled via a Toxicity Reduction Evaluation (TRE). A chemical-specific limit may be established in lieu of a WET limit where the permitting authority demonstrates, in the fact sheet or statement of basis, that the chemical limit will preclude toxicity. All available, valid, and relevant information will be used in making permitting decisions. LDEQ WET permitting practices follow the current agency policy on independent applicability.

References to sub-lethal effects in this Section apply only to chronic testing. Where the permit establishes 7-Day chronic test requirements, the reasonable potential analysis will be performed for both lethal and sub-lethal effects. Where the permit established 48-Hour acute test requirements, the reasonable potential analysis will be performed on lethal effects.

WET requirements are established for all LDEQ discharges classified as majors. (e.g., POTW ≥ 1.0 mgd design flow) and significant minors. Typically, WET testing requirements will be applied to the process wastewater outfall or other discharges with known or suspected toxicity potential. Exceptions to WET testing include once-through, non-contact cooling water discharges to which no chemical treatment is added, non-contact stormwater (low contamination potential), and any other wastewaters which may otherwise be covered under any general permit that does not require WET testing. WET requirements may also be applied on a case-by-case basis to minor dischargers with a known or suspected toxic potential.

Chronic toxicity tests shall generally be required of those discharges with potential toxicity (LAC 33:IX.1113.B.5) using critical dilutions as determined by an applicable dilution model (See section 5,"Establishing Permit Limits") for discharges into the waterbody categories as specified in LAC 33:IX.1115.C. However, the LDEQ Office of Environmental Services reserves the right to impose equivalent acute toxicity testing in addition to, or in lieu of, chronic toxicity testing (LAC 33:IX.1121.B.3) for minor facilities (EPA Region 6 classification) or discharges that have a critical dilution of five percent (5%) or less. When data is available, a site-specific acute to chronic ratio (ACR) may be calculated. An ACR of 10:1 can be used in the absence of site-specific data. The LDEQ will use a 0.75 dilution series in accordance with EPA Region 6 guidance. Also, in accordance with EPA Region 6 WET permitting strategy, permits shall require biomonitoring at some frequency for the term of the permit or where available data show reasonable potential to cause lethality or sub-lethality, the permit shall require a whole effluent toxicity (WET) limit or chemical-specific limit(s).

Major dischargers into intermittent streams and wetlands that lack perennial standing water shall be required to conduct 48 hour acute toxicity tests at the critical dilution of 100% effluent. However, chronic aquatic standards shall be met at the permitted discharge point based on the downstream perennial waterbody's low flow conditions. Toxicity testing for discharges into man-made watercourses will depend upon the uses designated for each watercourse. Chronic tests at instream critical flows will be required for those man-made watercourses with full fish and wildlife propagation uses.

During the term of the permit, if biomonitoring data demonstrates statistically significant lethal or sublethal toxic effects at the critical dilution or lower effluent dilutions, permittees will be required to retest their effluent monthly for the next three months to determine if toxicity is persistent or occurs on a periodic basis. The purpose of this testing is to determine whether toxicity is present at a level and frequency that will provide toxic sample results to use in performing a toxicity reduction evaluation (TRE). The additional tests are not performed for the purpose of confirming whether the original test failure was 'real'. If no additional test failures occur during the three-month period, the testing frequency will be once per quarter for the term of the permit or until another test failure occurs. If effluent toxicity is persistent, whole effluent toxicity (WET) limits and/or a Toxicity Reduction Evaluation (TRE) requirement will be applied, as appropriate. If the data indicates toxicity is intermittent, LDEQ may require biomonitoring at an increased frequency, and may require the facility to conduct a TRE.

In instances prior to permit issuance or reissuance where available data demonstrate reasonable potential to cause statistically significant lethal or sub-lethal effects, LDEQ will use the following procedures to require a whole effluent toxicity limit (WET limit) in the permit. WET limits shall be permitted as 30-day average minimum (or daily average) No Observed Effect Concentration (NOEC) for both acute and chronic testing and either a 48-hour minimum NOEC for acute testing or 7-day minimum NOEC for chronic testing. LDEQ will review all available effluent and instream information before deciding to establish a limit. NOTE – EPA’s current Policy on Independent Applicability precludes over-riding one form of aquatic protection with another, e.g., WET limits cannot be precluded on the basis that a biological survey did not find impairment to aquatic community. Because the Region 6 States have narrative criteria for aquatic life protection, a chemical specific limit may be substituted for a WET limit where the permitting authority demonstrates, in the fact sheet or statement of basis (as applicable), that limits on the chemical compound will preclude further toxic discharges.

LDEQ has established the following approaches to determine whether an effluent has demonstrated reasonable potential to cause or contribute to instream toxicity. During permit development, the previous five years’ WET data will be evaluated using a predictive statistical procedure similar to that presented on pages 52-54 of EPA’s Technical Support Document for Water Quality-based Toxics Control (EPA/505/2-90-001), Second Printing). If reasonable potential for WET is determined to exist based on that analysis and considering all other available information, WET limits will be included in the permit. A three year compliance schedule will be provided in all cases where WET limits are required based on this procedure.

Where there are < 10 test results per species at the time of permitting and calculations using this data indicate a high probability that reasonable potential exists, and LDEQ determines the existence of reasonable potential, then the permit must be issued with a WET limit.

After a permit is issued with monitoring-only requirements and the effluent fails the survival endpoint of a valid, permit-scheduled toxicity test, and also fails one or more of the required retests, the effluent will have met the definition of reasonable potential for WET. LPDES permits require the permittee to perform a 28-month Toxicity Reduction Evaluation (TRE), upon such a demonstration. At the end of the TRE, LDEQ will consider all information submitted and establish appropriate controls to prevent future toxic discharges, including WET and/or chemical-specific limits. A chemical-specific limit may be substituted where LDEQ can clearly demonstrate, in the permit fact sheet or statement of basis, that the toxicity has been fully characterized, the toxicant identified and confirmed, and appropriate controls selected. Where appropriate, a compliance schedule of up to three years may be allowed to attain compliance. In rare cases, a Best Management Practice (BMP) may be included as a permit control. If additional testing indicates that a chemical-specific limit or a BMP does not result in controlling lethal toxicity, the permit may then be revised to include lethal WET limit(s). LDEQ recognizes that special circumstances may warrant other actions, and may make occasional adjustments to the above policy based on special circumstances, however no such action shall result in a lowered level of aquatic life protection.

After a permit is issued with monitoring-only requirements and the effluent fails the sub-lethal endpoint (i.e., growth or reproduction) of a valid, permit scheduled toxicity test, the permittee shall be required to conduct retests once per month for the following three months. If any two of the three additional tests demonstrates significant sub-lethal effects at 75% effluent or lower, the effluent will have met the definition of reasonable potential for WET and the permittee shall initiate a 28-month sub-lethal TRE. At the end of the sub-lethal TRE, LDEQ will consider all information submitted and establish appropriate controls to prevent future toxic discharges, including WET and/or chemical-specific limits. A chemical-specific limit may be substituted where LDEQ can clearly demonstrate, in the permit fact sheet or statement of basis, that the toxicity has been fully characterized, the toxicant identified and confirmed, and appropriate controls selected. Where appropriate, a compliance schedule of up to three years may be allowed to attain compliance. In rare cases, a Best Management Practice (BMP) may be included as a permit control. If additional testing indicates that a chemical-specific limit or a BMP does not result in controlling sub-lethal toxicity, the permit then may be revised to include sub-lethal WET limit(s). LDEQ recognizes that special circumstances may warrant other actions, and may make occasional adjustments to the above policy based on special circumstances, however no such action shall result in a lowered level of aquatic life protection.

The minimum monitoring frequency for species under a WET limit is once per quarter for the term of the permit. WET limits may be removed from a permit after the first five years in effect, based on a demonstration of no lethal or sub-lethal effects during that period.

The following charts provide the process for determining the biomonitoring testing frequency. The chart for WET Testing (Monitoring Only; No Limits) below gives a general approach for permittees with no history of toxicity problems. Permittees will be required to biomonitor for the term of the permit.

WET Testing (Monitoring Only; No Limits):

Discharge Receiving Waters	Test Type	Monitoring Frequency	
		Most Sensitive	Least Sensitive
Critical Dilution < 1%	Acute	1/year	1/year
All Others	Chronic	1/quarter*	1/quarter*
All Others	Acute	1/quarter*	1/quarter*

* Upon successfully passing the first four consecutive quarters of WET testing after permit issuance/reissuance and in the absence of subsequent lethal and/or sub-lethal toxicity, the permittee may request a reduction in monitoring frequency. Generally, this shall be 1/6 months for the most sensitive species and 1/year for the least sensitive species upon certification of fulfillment of the WET testing requirements, and also providing that the effluent continues to exhibit no lethal or sub-lethal effects. During the permit development process, if significant and/or intermittent toxicity (lethal and/or sub-lethal) is noted, the testing frequency reduction option is not available.

WET Limits:

Discharge Receiving Waters	Test Type	Monitoring Frequency	
		Most Sensitive	Least Sensitive
All	Chronic	1/quarter*	1/quarter*
All	Acute	1/quarter*	1/quarter*

* There shall be no reduction in monitoring frequency for five (5) years from the effective date of the WET limit.

A. Test Species

For freshwater (average ambient salinity is < 2 ppt), acute tests will utilize *Daphnia pulex* and *Pimephales promelas* while chronic tests will utilize *Ceriodaphnia dubia* and *Pimephales promelas*.

For marine waters (average ambient salinity is $\geq$ 2 ppt), *Mysidopsis bahia* and *Menidia beryllina* will be used for both acute and chronic tests.

9. Compliance Schedules

The LDEQ Office of Environmental Services may include compliance schedules to allow adequate time to meet water quality based limits and progress reports will be required. Compliance schedules will generally be no longer than three years unless a variance from the applicable water quality standard is granted by the permitting authority.

10. Wetlands Approved for Wastewater Assimilation Projects

LDEQ recognizes that many of the state's wetlands are deteriorating due to a high natural subsidence rate and changes in hydrology and the resultant lack of nutrients, and suspended solids. Therefore, the department may allow the discharge of effluent with treatment equivalent to secondary treatment (LAC 33:IX.5911), at a minimum, into a wetland for the purpose of nourishing and enhancing the wetlands.

The permit approval process for the discharge of treated effluent into a wetland will require a feasibility assessment and a baseline study. After approval by LDEQ of the feasibility assessment, a permit application is required for submittal to LDEQ. Following a public participation process and review of the draft permit, a final permit may be issued. A baseline study must also be approved by LDEQ prior to permit issuance. Upon permit issuance, monitoring in the wetland and reporting of the results to LDEQ shall be required.

The following contains information on A) feasibility assessment, B) baseline study, C) permit issuance, D) permit implementation guidance, and E) references.

A. Feasibility Assessment

A feasibility assessment shall include:

1. a map and electronic geospatial data files showing delineation of the available wetland(s);
2. a map and electronic geospatial data files showing delineation of all Discharge and Reference Areas and proposed monitoring sites within the available wetland areas;
3. monitoring site coordinates (projected format of UTM, Zone 15, NAD 83 or unprojected format of WGS 84 in decimal degrees to 6 decimal places) of all monitoring locations;
4. monitoring site naming convention to be consistent for the Discharge Area as Near, Mid, Out, and for the Reference Area as Reference;
5. a list of landowners and the availability of ownership and/or easement agreement(s);
6. a description of the wetland type as defined in LAC 33:IX.1109.J.2 of wetland(s) available;

7. a description of the current and historical health status of available wetland(s);
8. a description of the surface hydrology and hydrograph of the proposed assimilation area;
9. a description of the proposed discharge distribution system layout and anticipated strategies for management of the distribution system, and how the proposed discharge distribution would affect the surface hydrology and how the facility will ensure that wet and dry periods, as appropriate, will be maintained in the wetland;
10. a description of the soil type of available wetland(s);
11. the number of acres of available wetland(s) and the number of acres of wetland(s) required for assimilation;
12. a description of activities that currently exist within the wetland (i.e., hunting, fishing, swimming, etc.);
13. a description of the predicted yearly long-term average loading rates (and basis for calculations) to the wetland(s) available (not to exceed 15 g total nitrogen (TN) m^{-2} yr^{-1} and 4 g total phosphorus (TP) $m^{-2}yr^{-1}$), which shall include an estimate of current TN and TP concentrations in discharge and actual flow;
14. for privately owned facilities – a description of facility's compliance history. Please note that facilities not consistently meeting secondary limits of 30 mg/L 5-day biochemical oxygen demand (BOD_5) and total suspended solids (TSS) monthly average and 45 mg/L BOD_5 and TSS weekly average may not be approved for an assimilation wetland.

The feasibility assessment may be public noticed. The permittee shall not initiate implementation of the baseline study or preparation of the permit application prior to receiving LDEQ's approval of the feasibility assessment.

B. Baseline Study

A baseline study of the wetland that includes, at a minimum, the following requirements for the Discharge and Reference Areas (methods are outlined in Section 10.D):

1. monitoring site coordinates (projected format of UTM, Zone 15, NAD 83 or unprojected format of WGS 84 in decimal degrees to 6 decimal places) of all monitoring locations;
2. monitoring site naming convention to be consistent for the Discharge Area as Near, Mid, Out, and for the Reference Area as Reference;
3. flora species diversity (relative diversity, relative dominance, relative density, importance value of woody vegetation) (Barbour et al., 1987) and percent whole cover of all vegetation (Folse et al., 2014);
4. aboveground vegetative productivity (including as appropriate perennial productivity, ephemeral productivity, and end of season live biomass, and net primary productivity) (Newbould, 1967; and Day et al., 2004);
5. water level measurements;
6. sediment and vegetative tissue analysis for metals (arsenic (As) cadmium (Cd), chromium (Cr), copper (Cu), , lead (Pb), , mercury (Hg), nickel (Ni), selenium (Se), silver (Ag) and zinc (Zn)) and nutrients (nitrate-nitrite nitrogen (NO_x), total Kjeldahl nitrogen (TKN), ammonia (NH_3), soluble reactive phosphorus (SRP), and TP);
7. water quality analysis, including salinity, dissolved oxygen (DO), pH, temperature, BOD_5, TSS, NO_x, TKN, NH_3, SRP, and TP;
8. TN and TP loading rates (and basis for calculations); and
9. accretion measurement(s) (see Section 6. Methods for Measuring Accretion).

The baseline study shall be submitted to and approved by LDEQ prior to permit issuance.

C. Permit Issuance

Following LDEQ approval of the feasibility assessment, a permit application shall be submitted to LDEQ.

LDEQ will review the application and draft a permit if determined appropriate that would be public noticed and available for public comment. After undergoing the public notice and comment period, a final permit decision will be prepared for issuance by LDEQ. Prior to issuance of a final permit, the baseline study shall be submitted to and approved by LDEQ.
Upon permit issuance, the permittee will be required to conduct ongoing physical, chemical, and biological measurements to ensure the health of the wetland. Measurements may include, but are not limited to, sampling in the Discharge and Reference Areas.

Permit monitoring and reporting requirements may include, but are not limited to:

1. flora species diversity
    a. relative diversity, relative dominance, relative density, and importance value of woody vegetation (Barbour et al., 1987), and
    b. percent whole cover of all vegetation (Folse et al. 2014);
2. aboveground vegetative productivity (including, as appropriate, perennial productivity, ephemeral productivity, and end of season live biomass, and net primary productivity) (Newbould, 1967; and Day et al., 2004);
3. water level measurements;
4. sediment and vegetative tissue analysis for metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Se, Ag, and Zn) and nutrients (NO_x, TKN, NH_3, SRP, and TP);
5. water quality analysis, including salinity, dissolved oxygen (DO), pH, temperature, BOD_5, TSS, NO_x, TKN, NH_3, SRP, TP, and any other water quality data determined to be essential in assessing the wetland;
6. accretion measurement (refer to Section 6. Methods for Measuring Accretion);
7. TN and TP loading rates (and basis for calculations); and
8. an adaptive management plan (refer to Section 8. Adaptive Management Plan).

D. <u>Permit Implementation Guidance</u>

The following provides permit implementation guidance for wetland area definitions; criteria implementation and permit requirements; methods for measuring flora species diversity, aboveground productivity in forested and marsh wetlands, and accretion; methods for calculation of nutrient loading rates in a wetland; and description of components of the adaptive management plan.

1. Wetland Area Definitions

According to LAC 33:IX.1113.B.12.b, the *Discharge Area* is defined as the area of a wetland directly affected by effluent addition. The *Reference Area* is defined as the wetland area that is nearby and similar to the Discharge Area but is not affected by effluent addition. The Discharge Area may be inclusive of the delineated assimilation area and consist of a minimum of near, mid, and out sites. The Reference Area will consist of a minimum of one reference site (with a minimum of three subplots).

The Discharge Area and Reference Area will be determined through the required feasibility assessment and baseline study described in Sections 10.A and 10.B above.

2. Criteria Implementation and Permit Requirements

Refer to LAC 33:IX.1113.B.12 for criteria that shall apply to a wetland receiving a discharge and refer to LAC 33:IX.1113 and 1123 for any additional site-specific criteria that may apply. Refer to permit for TN and TP yearly long-term loading rates to the wetland. Other criteria or requirements may be included as part of the permit.

Statistical analysis may be included in the permit requirements to compare the Discharge and Reference Areas. An alpha probability level of <0.05 will be used to define significance differences between site means. *If data from each group is <u>normally distributed</u> and the groups have an <u>equal variance</u>*, then a parametric analysis shall be used, such as the analysis of variance (ANOVA) tests using a Tukey-Kramer Honestly Significant Difference (HSD) test (Sall and Lehman, 1996). *If the data from each group is <u>not normally distributed</u> and the groups have <u>unequal variances</u>*, then a nonparametric analysis shall be used such as a nonparametric rank-sum (or Wilcoxon rank-sum) test (Helsel and Hirsch, 2002). The selected statistical analysis shall be described in the required reporting. Other statistical analyses may be required to determine differences between groups for more complicated methods, such as flora species diversity, and such tests shall be described in the required reporting.

3. Methods for Measuring Flora Species Diversity

Flora species diversity measurements include relative diversity, relative dominance, relative density, and importance value of woody vegetation and percent whole cover of all vegetation.

a. <u>Relative Density, Relative Dominance, Relative Frequency, and Importance Value for Woody Vegetation</u>

Within all Wetland Areas, three or more 10 x 100 m plots shall be established. These plots must be oriented perpendicular to the hydrological gradient. All trees within these plots with a diameter at breast height (dbh) greater than 10 cm shall be tagged with an identification number. The importance value (IV) of each species of woody vegetation in the Wetland Area is calculated from the relative density (RDen), relative dominance (RDom), and relative frequency (RF) of occurrence in each of the plots using the following equations (Barbour et al., 1987). All equations requiring dbh assume the measurement is in cm. Basal area (BA) is defined as dbh^2.

$$Total\ BA = \sum BA\ or \sum dbh^2$$

$$RCD = \ Den_{species\ A} = \frac{\#\ trees_{species\ A}}{\#\ trees_{all\ species}}$$

$$RDom_{species\ A} = \frac{Total\ BA_{species\ A}}{Total\ BA_{all\ species}}$$

$$RF_{species\ A} = \frac{frequency_{species\ A}}{frequency_{all\ species}}$$

$$IV_{species\ A} = RDen_{species\ A} + RDom_{species\ A} + RF_{species\ A}$$

b. <u>Percent Whole Cover</u>

Percent whole cover shall be measured based on slightly modified method that was established in Folse et al., 2014. Data should be collected between the months of August and September. Within each 10 x 100 m plot, 10 subplots of 1 x 1 m will be established randomly. It should be indicated if any portion of the plot is flooded. Estimate, to the nearest whole number, the total % whole cover of live vegetation in the plot. Total percent whole cover in marshes will include live trees, herbaceous, shrub, and carpet layers, bare ground/mudflat, dead vegetation, and open water. In swamps or bottomland hardwood forests, the tree layer (trees greater than 10 cm dbh) will be excluded from total cover. Total % whole cover must be between 0 and 100% and meet the following requirements:

- Cannot be greater than 100%,
- Cannot be greater than the sum of the individual plant species' % cover,
- Cannot be less than the % cover of any one plant species present, and
- Vegetation rooted outside of, but hanging over the plot is included in the total % whole cover estimate.

4. Methods for Measuring Aboveground Productivity in Forested Wetlands

At each forested wetland site, three 10 x 100 m plots should be established to measure forest productivity. Productivity of a forested wetland is defined as the sum of stem growth (perennial productivity) and leaf and fruit fall (ephemeral productivity). Aboveground net primary productivity (NPP) should be calculated as the sum of perennial and ephemeral productivity, and presented as live dry weight per square meter per year basis (g dry wt m^{-2} yr^{-1}).

a. Perennial Productivity – Stem Growth

Perennial productivity, or stem growth, should be calculated using diameter at breast height (dbh) measurements of all trees with dbh greater than or equal to 10 cm. Measurements of dbh should be taken during two consecutive winters when trees are dormant and biomass calculated using allometric equations according to species and dbh measurement (Megonigal et al., 1997; Scott et al., 1985; see Table 1 below). The following steps should be used to calculate perennial productivity:

i. Estimate biomass (in kg) from each dbh measurement using allometric equations (see Table 1).

Table 1. Allometric equations for calculating wood production. Equations are in the form *M=f(D)*, where *M* is the mass in kg, *D* is the diameter at breast height (dbh) in cm, and *f* is a parameterized function of *D.*

Species	Biomass = *f*(D)	Simplified Function	dbh range (cm)
Acer rubrum [a]	$M = 0.454*[2.39959*\{(D*0.394)^2\}^{1.20030}]$	$M = 0.11645*(D^{2.4006})$	10-28
Fraxinus spp.[a]	$M = 0.454*[2.699*\{(D*0.394)^2\}^{1.16332}]$	$M = 0.138762*(D^{2.32664})$	>10
Nyssa aquatica [a]	$M = 10^{\{-0.919+2.291*\log10(D)\}}$	$M = 0.120504*(D^{2.291})$	>10
Quercus nigra [a]	$M = 0.454*[3.15067*\{(D*0.394)^2\}^{1.21955}]$ $M = 0.454*[5.99898*\{(D*0.394)^2\}^{1.08527}]$	$M = 0.147514*(D^{2.4391})$ $M = 0.360696*(D^{2.17054})$	10-28 >28
Salix caroliniana [b]	$M = 10^{\{-1.5+2.78*\log10(D)\}}$	$M = 0.031623*(D^{2.78})$	>10
Taxodium distichum [b]	$M = 10^{\{-0.97+2.34*\log10(D)\}}$	$M = 0.107152*(D^{2.34})$	>10
Other Species [a]	$M = 0.454*[2.54671*\{(D*0.394)^2\}^{1.20138}]$ $M = 0.454*[1.80526*\{(D*0.394)^2\}^{1.27313}]$	$M = 0.123342*(D^{2.40276})$ $M = 0.076493*(D^{2.54626})$	10-28 >28

[a] Megonigal et al., 1997
[b] Scott et al., 1985

ii. Sum biomass per study site and year and divide by area (in m^2) of study site. This calculates the biomass per unit area (kg m^{-2}) for each year and study site.

$$Yr_1\ biomass = \sum biomass_{site\ A\ for\ year\ 1}$$

$$Yr_2\ biomass = \sum biomass_{site\ A\ for\ year\ 2}$$

iii. Subtract Year 2 biomass (kg m^{-2}) from Year 1 biomass (kg m^{-2}), and convert to g m^{-2}. This calculates Net Primary Productivity (NPP) as g m^{-2} yr^{-1}.

$$NPP = (Yr_2 biomass - Yr_1 biomass) * 1000$$

b. Ephemeral Productivity – Leaf and Fruit Fall (Leaf Litter)

Ephemeral productivity should be measured using 0.25 m^2 leaf litter boxes, with screened bottoms and approximately 10 cm wide sides. Six boxes should be placed randomly in each 10 x 100 m plots. Leaves, sticks, and fruit that collect in the boxes should be gathered bimonthly, separated into leaves/fruit and woody material, dried to a constant weight, and weighed. Ephemeral productivity should be calculated by summing the dried weight of leaves and fruit from each box over one year and extrapolating to grams per m^2.

5. Methods for Measuring Aboveground Productivity in Marsh Wetlands

At each marsh study site, end of season live (EOSL) biomass should be measured using five randomly placed 0.25 m^2 plots 10-20 m from the bayou edge in areas of relatively homogenous herbaceous vegetation. Samples should be collected from the plots during the last two weeks of September or the first two weeks of October. Vegetation within the quadrate should be cut as close to the marsh surface as possible, stored in labeled paper bags, brought back to the laboratory, and refrigerated until processing. Live material should be separated from dead, and dried at 60°C to a constant weight. Aboveground net primary productivity should be calculated by extrapolating the live dried weight of each sample to grams per m^2.

6. Methods for Measuring Accretion

Accretion rates will provide an indication of how effluent is contributing sediment and organic matter into the wetland area. Two methods will be accepted: feldspar and elevation table. If a site is completely submerged, the elevation table method shall be used. The method used for measuring accretion rate shall be documented along with the reported results.

a. Feldspar

Feldspar markers will be laid on the wetland surface in each of the Wetland Areas, with each plot having three 0.25 m^2 subplots where 1 cm thick powdered feldspar clay will be placed (Cahoon and Turner, 1989). The subplots will be marked at each corner with PVC poles. Every five years, the thickness of material deposited on top of the feldspar marker at one subplot of each plot will be measured destructively by: 1) taking a 20 cm x 20 cm plug using a shovel or trowel, 2) cleanly slicing the core into several sections to reveal the horizon, and 3) measuring the thickness of material above the surface of the horizon at 10 different locations. The rate of vertical accretion will be calculated by dividing the mean thickness of material above the surface of the horizon by the amount of time the horizon had been in place. If the makeup of the assimilation area does not allow the accretion measurements to be made, a full explanation shall be included in the accretion rates section of the monitoring report.

b. Elevation Table

The rod-surface elevation table (RSET) method is based on the method implemented by Coastal Protection and Restoration Authority of Louisiana (CPRA) for the Coastwide Reference Monitoring System Wetlands (CRMS-Wetlands) sites (Folse et al., 2014). The RSET method provides a precise measure of the changes in surface elevation over time relative to a fixed subsurface datum. A series of 4-ft stainless steel benchmark rods are driven through the root zone, the organic matter, and any soft underlying materials until the rods encounter resistance. The remaining rod should measure two ft above the soil/sediment surface and be stabilized by a 6-in diameter pipe that will be cemented at the soil/sediment surface. A collar will be permanently attached to the rod to provide a constant horizontal reference plane for long-term repeatability as the table will remains fixed. Multiple measurements (made from the same location each year) should be taken from the bottom of the reference plane to the soil/sediment surface. Using previously collected data, the rate of vertical change can be calculated with respect to changes occurring between the soil/sediment surface and the horizontal reference plane.

7. Methods for Calculating Daily Maximum and Maximum 30-Day Permit Targets for Total Phosphorus (TP) and Total Nitrogen (TN) Based on Yearly Long-Term Loading Rates

Based on the yearly long-term average loading rates specified in Section 10.A.13 and the acreage of wetland into which the effluent is discharged, an effluent loading rate for TN and TP will be calculated and included in the permit. First, the yearly loading rates are converted from g m^{-2} to pounds (lbs) $acre^{-1}$. The product is divided by 365 days yr^{-1} to calculate the daily long-term average loading rate. The dividend is inserted into the calculation of permit limits using the statistical approach by using the multipliers from Section 5.A.3 of this volume to determine the daily maximum (multiplier 3.11) and maximum 30-day (multiplier 1.31) loading rate limits.

4 g-TP $m^{-2}yr^{-1}$ = 35.6 lbs-TP $acre^{-1}$ yr^{-1}
(actual value will be specific to the facility's wastewater concentration)

As an example for TP, if the acreage of the wetland into which the effluent is discharged was to 234 acres then, the yearly loading rate is:

(35.6 lbs-TP acre yr^{-1}) * 234 acres = 8330 lbs-TP yr^{-1}

the long-term average daily loading rate is:

(8330 lbs-TP yr^{-1})/365 days yr^{-1} = 22.8 lbs-TP day^{-1}

Using the multipliers found in Section 5.A.3 of this volume, the daily maximum discharge loading rate is:

(22.8 lbs-TP day^{-1}) * 3.11 = 70.9 lbs-TP day^{-1}

the maximum 30-day discharge loading rate is:

(22.8 lbs-TP day^{-1}) * 1.31 = 29.9 lbs-TP day^{-1}

8. Adaptive Management Plan

The ongoing management of the wetland assimilation site is critical to the success of the wetland assimilation project. Therefore, development and implementation of an Adaptive Management Plan ('Plan') is required. This Plan shall include all management practices necessary to ensure the health of the wetland assimilation area. This shall include, but is not limited to, the following:

a. *Historical and current conditions of the wetland assimilation areas* – The Adaptive Management Plan shall include the historical and current conditions of the wetland assimilation areas. This may include a record of plant species, current state of degradation, probable cause of the degradation, etc. The Plan shall include an overview on how the wetlands assimilation project and the specific adaptive management practices are benefiting the overall health to the wetland areas.

b. *Discharge distribution plan* – This shall be an established procedure describing how the effluent will be distributed into the wetland assimilation area, promoting restoration and sustainability of the wetland ecosystem while, at the same time, assimilating nutrients. Healthy wetlands typically experience a natural pulsing, or fluctuation, of floodwaters. Therefore, the discharge distribution plan must establish a method to discharge effluent into the wetlands in a manner that ensures uniform coverage and to the maximum extent possible simulates natural healthy conditions, within the wetland assimilation area.

c. *Use of water control structures* – The use of water control structures should be used in areas to avoid short-circuiting to maximize the assimilation potential of the wetland.

d. *Extension or modification of water distribution system* – The extension of the water distribution system may be necessary to ensure uniform coverage across the assimilation area.

e. *Control of invasive species, including plant and animal* – The introduction of nutrient enriched effluent may invite many invasive species into the wetland assimilation area, which may cause a negative impact to the area. Therefore, a program designed to control these invasive species should be developed.

f. *Plantings of trees and other vegetation* – In some cases, the wetland assimilation areas are heavily degraded and are permanently flooded. In these areas, the planting of seedlings may be advantageous to ensure new growth, thus enhancing the longevity and sustainability of the wetland assimilation area.

g. *Dye studies* – As treated wastewater is discharged into the wetland assimilation area, changes within the area are expected. A negative impact could be channelization of the effluent, reducing the assimilation potential of the area. Therefore, in the fourth year of the permit cycle, dye studies shall be conducted to ensure that uniform coverage over the wetland assimilation area is being maintained.

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APPENDIX A

TEXT OF LETTER FERGUSON (EPA) TO CHANG (LDEQ) DATED 10/8/91 CONCERNING THE DETERMINATION OF THE NEED FOR WATER QUALITY-BASED PERMIT EFFLUENT LIMITATIONS

The Region 6 Permits Branch has developed a procedure for effluent data analysis that we will use in FY92 to determine when a water quality based permit limitation is necessary. Our regulations call for the imposition of a permit limit if there is a "reasonable potential" to exceed a water quality standard. The limited effluent data obtained with the permit application may not represent a complete picture of the actual range of pollutant concentrations.

Assessing the potential to cause a water quality violation is one of many points which need to be covered in water quality standard implementation documents. To date, the only state permitting implementation to address "reasonable potential" is that developed by the Texas Water Commission. The Region 6 staff has worked up a sound and straightforward method that we will use in writing permits for the other states in the region, providing us with a workable alternative to the method described in the Technical Support Document for Toxics.

Our letter of January 3, 1991, described a statistical approach that would allow us to use a single piece of data or a small number of effluent measurements to estimate the upper range of concentrations that could be discharged and cause an exceedance of a standard. This procedure can be used to estimate the 95th percentile of an effluent data set, or the value that would be expected to exceed 95% of effluent concentrations in a discharge. The estimate of the 95th percentile is obtained by the following relationship:

pollutant concentration * 2.13 = 95th percentile pollutant concentration

The procedure is based upon the relationship of the geometric mean to the 95th percentile in a lognormal distribution, assumes a constant coefficient of variance and is independent of the number of data points considered.

A single measurement of pollutant concentration or the geometric mean of multiple measurements may be used to estimate the upper range value. The upper range estimate of the pollutant is then used to calculate the concentration of that toxic parameter after dilution in the receiving stream. For example, if a permittee reported an effluent measurement of 4.0 μg/L of cadmium, the upper range of cadmium expected for that discharge would be estimated as 8.5 μg/L. The permit writer would determine if a discharge of 8.5 μg/L of cadmium would cause an exceedance of the applicable water quality criteria.

Our permit writers will begin using the above procedure in writing FY92 permits to examine the potential of a discharge to cause an excursion above a water quality standard. For Texas permits, reasonable potential to violate a standard will be assessed in the manner described in the TWC implementation policy. A permit limit will be imposed on Texas dischargers if the effluent pollutant concentration is within 85% of the allowable value. The permittee will measure and report that parameter if within 70% of the limit.

All of our states should address the "reasonable potential" of a discharge to cause excursions above water quality standards in an implementation document or their Continuing Planning Process. They may reference the method Region 6 has developed or adopt something of equivalent stringency.

Accommodating the uncertainty in effluent data will be protective and will likely result in a higher number of permits containing water quality-based limits. We believe our approach will provide the permit writers with a consistent, clean and equitable technique of implementing water quality standards. Please let met know if you have any questions on this. If your staff has questions on the underlying statistics, they may speak with Jane Watson of my staff at (214) 655-7175.

ATTACHMENT TO LETTER FERGUSON (EPA) TO CHANG (LDEQ) DATED 10/8/91

REGION 6 APPROACH
DETERMINING REASONABLE POTENTIAL

Region 6 has developed a procedure to extrapolate limited data sets to better evaluate the potential for the higher effluent concentrations to exceed a State water quality standard. Our method yields an estimate of a selected upper percentile value. We believe that the most statistically valid estimate of an upper percentile value is a maximum likelihood estimator which is proportional to the population geometric mean. If one assumes the population of effluent concentrations to fit a lognormal distribution, this relationship is given by:

$$C_p = C_{mean} * \exp(Z_p * \sigma - 0.5 * \sigma^2)$$

where, Zp = normal distribution factor at p^{th} percentile

$$\sigma^2 = \ln(CV^2 + 1)$$

To calculate the maximum likelihood estimator of the 95^{th} percentile, the specific relationship becomes:

$$C_{95} = C_{mean} * \exp([1.645 * \sigma] - [0.5 * \sigma^2])$$

if CV is assumed = 0.6,

$\sigma^2 = 0.307$

The ratio of the estimated 95^{th} percentile value to the mean (C_{95}/C_{mean}) is calculated:

$$\frac{C_{95}}{C_{mean}} - 2.13$$

A single effluent value or the geometric mean of a group of values is multiplied by the ratio to yield the estimate of the 95^{th} percentile value.

The following table shows the ratio of the upper percentile to the mean for the 90^{th}, 95^{th}, and 99^{th} percentiles

Ratio of Upper Percentiles to Geometric Mean

Percentile	Z	$C_{\%}/C_{mean}$
90	1.283	1.74
95	1.645	2.13
99	2.386	3.11

APPENDIX B

MINIMUM QUANTIFICATION LEVELS (MQLs)
LOUISIANA SURFACE WATER QUALITY STANDARDS

Minimum quantification levels for state water permitting assessments are set at the following values based on the listed published analytical methods (SM = Standard Methods, 23rd Edition).

Parameters	MQL (µg/L)
NONCONVENTIONAL	
Phenolics, Total Recoverable*	5
Chlorine (Total Residual)	33
3-Chlorophenol*	10
4-Chlorophenol*	10
2,3-Dichlorophenol*	10
2,4-Dichlorophenol*	10
2,5-Dichlorophenol*	10
2,6-Dichlorophenol*	10
3,4-Dichlorophenol*	10
2,4-D*	10
2,4,5-TP*	4
METALS	
Aluminum (Total)	2.5
Antimony (Total)	60
Arsenic*	5
Beryllium (Total)	0.5
Cadmium*	1
Chromium (Total)	10
Chromium*	10
Chromium*	10
Copper*	3
Lead*	2
Mercury*	0.0005/0.005
Molybdenum(Total)	30
Nickel (freshwater)*	5
Nickel (marine)*	5
Selenium (Total)	5
Silver (Total)	0.5
Thallium (Total)	0.5
Zinc*	20
Cyanide (Total)	10
DIOXIN	
2,3,7,8-TCDD*	0.00001
VOLATILE COMPOUNDS	
Acrolein	50
Acrylonitrile	20
Benzene*	10
Bromoform*	10
Bromodichloromethane*	10

Parameters	MQL (µg/L)
Carbon Tetrachloride*	2
Chlorobenzene	10
Chlorodibromomethane*	10
Chloroethane	50
2-Chloroethylvinylether	10
Chloroform*	10
1,2-Dichlorobenzene	10
1,3-Dichlorobenzene	10
1,4-Dichlorobenzene	10
Dichlorobromomethane*	10
1,1-Dichloroethane	10
1,2-Dichloroethane*	10
1,1-Dichloroethylene*	10
1,2-Dichloropropane	10
1,3-Dichloropropylene*	10
Ethylbenzene*	10
Methyl Bromide [Bromomethane]	50
Methyl Chloride [Chloromethane]	50
Methylene Chloride*	20
1,1,2,2-Tetrachloroethane*	10
Tetrachloroethylene*	10
Toluene*	10
1,2-trans-Dichloroethylene	10
1,1,1-Trichloroethane*	10
1,1,2-Trichloroethane*	10
Trichloroethylene*	10
Vinyl Chloride*	10
ACID COMPOUNDS	
2-Chlorophenol*	10
2,4-Dichlorophenol*	10
2,4-Dimethylphenol*	10
4,6-Dinitro-o-Cresol*	50
2,4-Dinitrophenol*	50
2-Nitrophenol*	20
4-Nitrophenol*	50
p-Chloro-m-Cresol*	10
Pentachlorophenol	5
Phenol*	10
2,4,6-Trichlorophenol*	10
BASE/NEUTRAL	
Acenaphthene	10
Acenaphthylene	10
Anthracene	10
Benzidine*	50
Benzo(a)anthracene	5
Benzo(a)pyrene	5
3,4-Benzoflouranthene	10
Benzo(ghi)perylene	20

Parameters	MQL (µg/L)
Benzo(k)fluoranthene	5
Bis(2-chloroethoxy) Methane	10
Bis(2-chloroethyl) Ether	10
Bis(2-chloroisopropyl) Ether	10
Bis(2-ethylhexyl) Phthalate	10
4-Bromophenyl Phenyl Ether	10
Butylbenzyl Phthalate	10
2-Chloronaphthalene	10
4-Chlorophenyl Phenyl Ether	10
Chrysene	5
Dibenzo(a,h) anthracene	5
3,3'-Dichlorobenzidine	5
Diethyl Phthalate	10
Dimethyl Phthalate	10
Di-n-butyl Phthalate	10
2,4-Dinitrotoluene	10
2,6-Dinitrotoluene	10
Di-n-octyl Phthalate	10
1,2-Diphenylhydrazine	20
Fluoranthene	10
Fluorene	10
Hexachlorobenzene*	5
Hexachlorobutadiene*	10
Hexachlorocyclopentadiene*	10
Hexachloroethane	20
Indeno(1,2,2-cd)pyrene	5
Isophorone	10
Naphthalene	10
Nitrobenzene	10
n-Nitrosodimethylamine	50
n-Nitrosodi-n-Propylamine	20
n-Nitrosodiphenylamine	20
Phenanthrene	10
Pyrene	10
1,2,4-Trichlorobenzene	10
PESTICIDES	
Aldrin*	0.01
Alpha-BHC	0.05
Beta-BHC	0.05
Gamma-BHC [Lindane]*	0.05
Delta-BHC	0.05
Chlorodane*	0.2
4,4'-DDT*	0.02
4,4'-DDE*	0.1
4,4'-DDD*	0.1
Dieldrin*	0.02
Alpha-Endosulfan*	0.01
Beta-Endosulfan*	0.02

Parameters	MQL (µg/L)
Endosulfan Sulfate	0.1
Endrin*	0.02
Endrin Aldehyde	0.1
Heptachlor*	0.01
Heptachlor Epoxide	0.01
PCB-1242*	0.2
PCB-1254*	0.2
PCB-1221*	0.2
PCB-1232*	0.2
PCB-1248*	0.2
PCB-1260*	0.2
PCB-1016*	0.2
Toxaphene*	0.3

*Numerical criteria for this parameter present in Table 1 of LAC 33:IX.1113.

APPENDIX C

TEXT OF LETTER NORTON AND GARDNER (EPA-REGION 6) TO STENGER (EPA-REGION 6) DATED 1/8/91 CONCERNING WET LIMIT DILUTION SERIES

We recommend setting a constant dilution series for WET limits that brackets the critical dilution set as the NOEC (No Observed Effect Concentration). There are a number of benefits derived from taking this approach that we recommend will result in the use of the most efficient, powerful, and scientifically defensible statistical procedure (parametric analysis). In addition, this approach provides for consistency and permit writer ease. The new Acute Manual for toxicity testing (Sept. 1991) recommends using a 0.5 or greater dilution series. After looking at the dilution series produced by various factors for use in WET limits, we chose 0.75 as the factor which dealt dilution concentrations from low-end critical dilutions to high-end critical dilutions. This 0.75 dilution series factor was chosen for several reasons. First, this value produced dilution series which provided reasonable separation between concentrations at all critical dilutions. Second, this value does not allow any dilution concentration for any given critical dilution an exposure concentration that exceeds approximately three (3) times the critical dilution of that given series. This allows for adequate difference in dilution concentrations without significantly increasing the potential for zero variability within groups of a given dilution concentration (leading then to the use of the less preferable statistical procedure, non-parametric analysis). Finally, the 0.75 dilution series factor follows the recommendations set forth in the new acute toxicity testing manual.

The attached table lists critical dilutions from 1 to 100 with the dilution series corresponding to the use of the 0.75 dilution factor. The concentrations are rounded off to the nearest whole number. This table could be incorporated into the Permit Writers Guide along with the rationale for choosing this factor. Permit writers (example, Arizona Chemical NOEC = 4.8%) may wish to calculate their own series using the 0.75 factor for precision purposes.

0.75 Dilution Series

Critical Dilution				
0.4	0.6	0.8	1.0	1.3
0.8	1.1	1.5	2.0	2.7
1.3	1.7	2.3	3.0	4.0
1.7	2.3	3.0	4.0	5.3
2.1	2.8	3.8	5.0	6.7
2.5	3.4	4.5	6	8
3	4	5	7	9
3	5	6	8	11
4	5	7	9	12
4	6	8	10	13
5	6	8	11	15
5	7	9	12	16
5	7	10	13	17
6	8	11	14	19
6	8	11	15	20
7	9	12	16	21
7	10	13	17	23
8	10	14	18	24
8	11	14	19	25
8	11	15	20	27
9	12	16	21	28
9	12	17	22	29

Critical Dilution				
10	13	17	23	31
10	14	18	24	32
11	14	19	25	33
11	15	20	26	35
11	15	20	27	36
12	16	21	28	37
12	16	22	29	39
13	17	23	30	40
13	17	23	31	41
14	18	24	32	43
14	19	25	33	44
14	19	26	34	45
15	20	26	35	47
15	20	27	36	48
16	21	28	37	49
16	21	29	38	51
16	22	29	39	52
17	23	30	40	53
17	23	31	41	55
18	24	32	42	56
18	24	32	43	57
19	25	33	44	59
19	25	34	45	60
19	26	35	46	61
20	26	35	47	63
20	27	36	48	64
21	28	37	49	65
21	28	38	50	67
22	29	38	51	68
22	29	39	52	69
22	30	40	53	71
23	30	41	54	72
23	31	41	55	73
24	32	42	56	75
24	32	43	57	76
24	33	44	58	77
25	33	44	59	79
25	34	45	60	80
26	34	46	61	81
26	35	47	62	83
27	35	47	63	84
27	36	48	64	85
27	37	49	65	87
28	37	50	66	88
28	38	50	67	89
29	38	51	68	91
29	39	52	69	92
30	39	53	70	93

Critical Dilution					
	30	40	53	71	95
	30	41	54	72	96
	31	41	55	73	97
	31	42	56	74	99
	32	42	56	75	100
24	32	43	57	76	
24	32	43	58	77	
25	33	44	59	78	
25	33	44	59	79	
25	34	45	60	80	
26	34	46	61	81	
26	35	46	62	82	
26	35	47	62	83	
27	35	47	63	84	
27	36	48	64	85	
27	36	48	65	86	
28	37	49	65	87	
28	37	50	66	88	
28	38	50	67	89	
28	38	51	68	90	
29	38	51	68	91	
29	39	52	69	92	
29	39	52	70	93	
30	40	53	71	94	
30	40	53	71	95	
30	41	54	72	96	
31	41	55	73	97	
31	41	55	74	98	
31	42	56	74	99	
32	42	56	75	100	

APPENDIX D

EXAMPLE OF WATER QUALITY BASED LIMIT CALCULATION AND SCREENING PROCEDURES

A facility is discharging 0.5 MGD (2 year, 30-day max) into a stream with a critical flow of 6.189 cfs or 4 MGD. The harmonic mean is 16.091 cfs or 10.4 MGD. The flow basis for calculating effluent WQBLs and technology based limits shall be the same for this example. Assume 1 final outfall. The sample pollutant of concern is benzene. The designated uses for the hypothetical receiving stream include primary and secondary contact recreation and aquatic life propagation. The designated uses of the hypothetical stream do not include drinking water supply. HHc or hhc stands for "human health carcinogen". HHnc or hhnc stands for "human health non-carcinogen".

The numerical criteria (C_r) for benzene are:

Freshwater acute aquatic life = 2249 µg/L
Freshwater chronic aquatic life = 1125 µg/L
Human health, non-drinking water = 12.5 µg/L
Benzene is a listed human health carcinogen.

Technology-based limits for benzene are:

OCPSF Guideline, Subpart J, for Benzene, Daily Maximum = 134 µg/L
OCPSF Guideline, Subpart J, for Benzene, Maximum 30-Day = 57 µg/L

Reported end-of-pipe values for benzene are:

Long-Term Avg.= 150 µg/L
Daily Maximum = 320 µg/L

Q_e = 0.5 MGD
Qr_a = 4 MGD
Qr_{hhnc} = 10.4 MGD
F_s = 1 for MZ and 0.1 for ZID

$$ZID\ Dilution \frac{0.5}{4 * 0.1 + 0.5} = 0.5556$$

$$MZ\ Dilution \frac{0.5}{4 * 1 + 0.5} = 0.1111$$

$$HHc\ Dilution \frac{0.5}{10.4 * 1 + 0.5} = 0.0459$$

Benzene is a carcinogen, so the human health non-carcinogen dilution calculation was not necessary.

Acute protection at ZID:
$WLA_a = \frac{2,249\ \mu g/L}{0.5556}$
= 4,048 µg/L
LTA_a = 4,048 µg/L * 0.32
= 1,295 µg/L

Chronic protection at MZ:
$WLA_c = \frac{1,125\ \mu g/L}{0.1111}$
= 10,126 µg/L
LTA_c = 10,126 µg/L * 0.53
= 5,367 µg/L

Human health:
$WLA_h = \frac{12.5\ \mu g/L}{0.0459}$
= 272.3 µg/L
LTA_h = 272.3 µg/L

The limiting parameter is LTA_h = 272.3 µg/L

WQBLs:

Daily Maximum = 272.3 µg/L * 2.38 = 648.1 µg/L
Maximum 30-Day Avg.= 272.3 µg/L
(no multiplier used if human health criteria is most limiting)

Converting to mass using mass balance formula (mg/L * MGD * 8.34):

$$\text{Daily Maximum} = \frac{648.1\ \mu g/L}{1{,}000} * 0.5\ MGD * 8.34\ lbs/gal = 2.703\ \text{lbs/day}$$

$$\text{Maximum 30-day Avg} = \frac{272.3\ \mu g/L}{1{,}000} * 0.5\ MGD * 8.34\ lbs/gal = 1.136\ \text{lbs/day}$$

Screening Procedure; Technology Based Limits:

First, technology limits need to be set for the hypothetical facility:

Mass limits need to be calculated for the technology-based limits, which in this case are the Organic Chemicals, Plastics, and Synthetic Fibers (OCPSF) guidelines, Subpart J, which are concentration based for the toxics and include the pollutant benzene:

OCPSF Subpart J Guideline for benzene:
Maximum 30-Day Avg.= 57 µg/L or 0.057 mg/L
Daily Maximum = 134 µg/L or 0.134 mg/L

OCPSF Guideline concentration x Flow x 8.34 lbs/gal = technology mass limit for benzene:

Maximum 30-Day = 0.057 mg/L * 0.5 MGD * 8.34 lbs/gal = 0.24 lbs/day
Daily Maximum = 0.134 mg/L * 0.5 MGD * 8.34 lbs/gal = 0.56 lbs/day

Screening; choose the lesser of the calculated effluent WQBLs and technology-based limits:

Maximum 30-Day Avg. effluent WQBL	= 1.14 lbs/day
Maximum 30-Day OCPSF Guideline limit	= 0.24 lbs/day
Daily Maximum effluent WQBL	= 2.70 lbs/day
Daily Maximum OCPSF Guideline limit	= 0.56 lbs/day

For both Maximum 30-Day Avg. and Daily Maximum limits, technology was the lesser or more limiting value.

Resulting permit limits at the final outfall:
Maximum 30-Day Avg. = 0.24 lbs/day
Daily Maximum = 0.56 lbs/day

Screening Procedure Using Reported End-of-Pipe (EOP) Values in the Absence of Technology-Based Limits:

For this example, let's assume that there are no appropriate technology-based limits (OCPSF) available for the pollutant of concern, benzene. First, "reasonable potential" for exceeding the maximum 30-day effluent WQBL needs to be established:

As stated in section 5.B, "reasonable potential" is established by multiplying the average reported EOP value by 2.13. "Reasonable potential" addresses the statistical likelihood that a reported discharge value would or would not exceed an effluent WQBL. This is set at 95% confidence using a lognormal distribution as stated in section 5.B.

"Reasonable potential" calculation:
0.15 mg/L * 2.13 = 0.32 mg/L

Use mass balance to convert concentration to mass for screening purposes:

0.32 mg/L * 0.5 MGD * 8.34 lbs/gal = 1.33 lbs/day

Screening; compare the calculated maximum 30-day effluent WQBL and the results of the "reasonable potential" calculation:

Maximum 30-Day Avg. effluent WQBL	= 1.14 lbs/day
Reported EOP value x 2.13	= 1.33 lbs/day

If the reported EOP value x 2.13 is greater than the calculated maximum 30-day Avg. effluent WQBL then both maximum 30-day Avg. and daily maximum effluent WQBLs shall be placed in the permit. Generally, if the reported EOP value x 2.13 is less than the calculated maximum 30-day Avg. effluent WQBL, no numerical limit would be placed in the permit, however monitoring may be required on a BPJ basis. Since the reported EOP value x 2.13 is greater than the calculated maximum 30-day Avg. effluent WQBL, the limits would be as follows:

Maximum 30-Day Avg.	= 1.14 lbs/day
Daily Maximum	= 2.70 lbs/day

APPENDIX E

CARCINOGEN AND NON-CARCINOGEN DESIGNATIONS FOR NUMERICAL CRITERIA

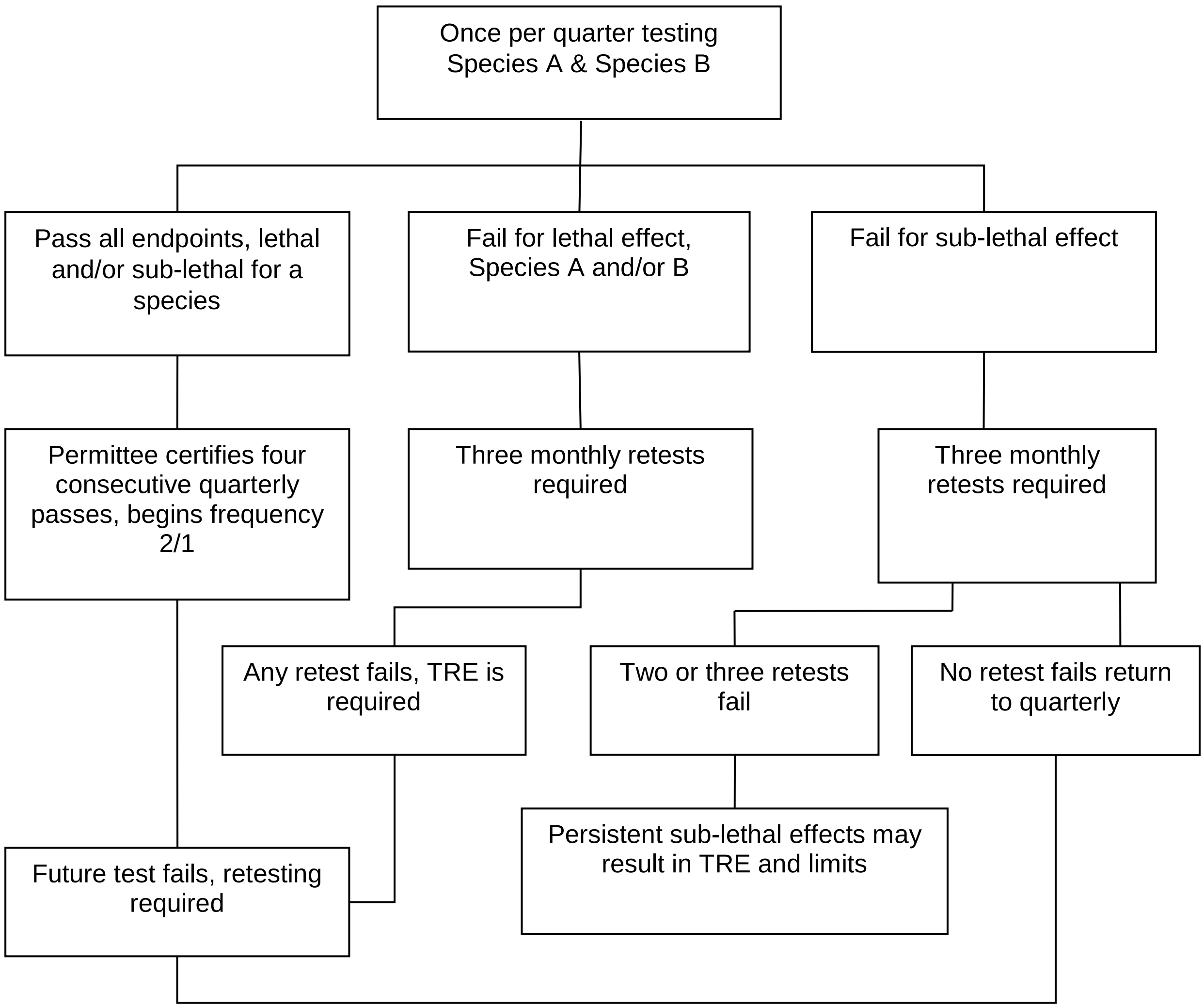
Name	Cancer Group
Carcinogen*	
1. Aldrin	B2
2. Chlordane	B2
3. DDT	B2
4. TDE (DDD)	B2
5. DDE	B2
6. Dieldrin	B2
7. Heptachlor	B2
8. Lindane (Hexachlorocyclohexane, gamma BHC)	B2 (Potency Slope Factor Pending)
9. PCB	B2
10. Toxaphene	B2
11. Benzene	A
12. Carbon Tetrachloride	B2
13. Chloroform	B2
14. 1,2-Dichloroethane (EDC)	B2
15. 1,1,2-Trichloroethane	C
16. 1,1,2,2-Tetrachloroethane	C
17. 1,1-Dichloroethylene	C
18. Trichloroethylene	B2
19. Tetrachloroethylene	B2
20. Vinyl Chloride	A
21. Bromoform	B2
22. Bromodichloromethane	C
23. Methylene Chloride	B2
24. Methyl Chloride	B2 (Human Health Criteria Removed)
25. Dibromochloromethane	B2
26. Benzidine	A
27. Hexachlorobenzene (HCB)	B2
28. Hexachlorobutadiene (HCBD)	C
29. 2,3,7,8-Tetrachlorodibenzo-p-dioxin	B2
30. Chromium VI	-
Non-Carcinogen*	
1. Endosulfan	-
2. Endrin	D
3. Ethylbenzene	D
4. Toluene	D
5. 1,1,1-Trichloroethane	D (Human Health Criteria Removed)
6. 1,3-Dichloropropene	-
7. 2-Chlorophenol	-
8. 3-Chlorophenol	-
9. 4-Chlorophenol	-
10. 2,3-Dichlorophenol	-
11. 2,4-Dichlorophenol	-
12. 2,5-Dichlorophenol	-
13. 2,6-Dichlorophenol	-
14. 3,4-Dichlorophenol	-
15. Phenol (Total)	-
16. Arsenic	-
17. Chromium III	-
18. Zinc	-

Name	Cancer Group
19. Cadmium	-
20. Copper	-
21. Lead	-
22. Mercury	-
23. Nickel	-
24. Cyanide	-

*Based on EPA Carcinogen Classification System
A - Human Carcinogen, Adequate Human Data
B2- Probable Human Carcinogen, Adequate Animal Data - Inadequate Human Data
C - Possible Human Carcinogen, Inadequate Animal Data - No Human Data
D - Not Classifiable as to Human Carcinogenicity

APPENDIX F

Minimum WET Testing Frequency Flow Chart



This flow chart represents the MINIMUM WET testing frequencies for major dischargers. Additional WET testing may be appropriate.

APPENDIX G

Guidance for Discharges into Impaired Waterbodies or Waterbodies Subject to a TMDL

Section 1 - Introduction:

In fulfillment of the requirements of the Federal Clean Water Act (CWA) Section 305(b) and 303(d), surface waters not meeting water quality standards are identified in the Louisiana Water Quality Inventory Integrated Report (IR). The IR identifies all surface waters and categorizes them based upon surface water monitoring data collected as part of the Ambient Water Quality Monitoring Program. Total Maximum Daily Loads (TMDLs) have been developed and approved to address many waterbody-impairment combinations in accordance with 40 CFR 130.7(c). Surface waters of Louisiana are identified by discrete hydrological units named subsegments and are identified in the IR.

Subsegment numbers, descriptions, designated uses, and applicable criteria are described in LAC 33:IX, Chapter 11; Table 3 in Section 1123 specifically lists all subsegments. Per LAC 33:IX.1111.A*, Designated uses assigned to a subsegment apply to all water bodies (listed water body and tributaries/distributaries of the listed water body) contained in that subsegment unless unique chemical, physical, and/or biological conditions preclude such uses. However, the designated uses of drinking water supply, outstanding natural resource waters, and/or oyster propagation apply only to the water bodies specifically so designated in LAC 33:IX.1123, Table 3, and not to any tributaries or distributaries to such water bodies.* Furthermore, *except where specifically exempted elsewhere in these standards, the general criteria shall apply at all times to the surface waters of the state, including wetlands, whether they are identified in the standards or not.*

Current subsegment delineations and the criteria and tools by which delineations are determined are further described and documented in Volume 4 of LDEQ's Water Quality Management Plan, *Basins and Subsegment Boundaries*. Subsegments are delineated into discrete, hydrological units in order to prioritize and manage water quality. Delineations are primarily based on hydrology, but also take into account man-made structures such as weirs, dams, diversions and levees that may require site-specific water quality standards. Additionally, Volume 4 recognizes that watersheds in certain portions of the state "are not integrated into an efficient system, but wander in complex drainage networks over the area" and "are subject to tidal and Aeolian influences." Although designated uses and criteria generally apply to entirety of the subsegment, water quality impairments and TMDLs may only apply to a portion of the subsegment due to the lack of direct connectivity and influence between a minor water body within the subsegment and the main (named) water body described in Table 3 of the water quality standards. For example, the 2020 IR identifies Henderson Lake, located within Subsegment 010301 (West Atchafalaya Basin Floodway), as impaired for mercury in fish tissue. The remainder of the subsegment is not subject to this impairment listing. Another example of this is the Bayou Cane TMDL for Oxygen Demanding Pollutants (Subsegments 040903, 040904, and 040914). This TMDL only includes tributaries directly connected to Bayou Cane and is not applicable to hydrologically isolated waterbodies within the subsegment, such as Bayou Castine.

Impaired and previously impaired subsegments subject to a TMDL are identified in the *Louisiana Water Quality Management Plan, Volume 8, Wasteload Allocations/Total Maximum Daily Loads and Effluent Limitations Policy*, LDEQ, February 24, 2017, or most recent revision (Volume 8). Although a subsegment is listed in the IR as meeting standards (Category 1), it still may be identified in Volume 8 as being subject to a TMDL due to previous impairments. The following procedures have been identified for discharges to impaired water bodies and water bodies subject to a TMDL. As previously discussed, not all impairments or TMDLs are applicable to the entire subsegment. LDEQ relies heavily on the text of the TMDLs, as well as the facilities and tributaries included in the model to develop an appropriate permitting strategy. These procedures describe the evaluative process for assessing a proposed or existing discharge's potential to impact a receiving waterbody, whether or not a TMDL is applicable, and the process for tracking the distribution of a TMDL's wasteload allocation (WLA). The purpose of these procedures is to establish a standardized approach to permitting and TMDL implementation, while taking into account each individual TMDL's requirements. Examples of past permitting scenarios may be included, but are not intended to be an exhaustive list of all possible situations and permit decisions.

Section 2 – Applicability:

These procedures are applicable to facilities that require an LPDES permit and are:

- existing, new and/or increased discharges to a subsegment currently listed on the Integrated Report as impaired for one or more water quality standard,
- existing, new and/or increased discharges to a subsegment for which a TMDL has been developed and approved, and
- discharges subject to a TMDL for which the criteria has been revised.

Section 3 – Discharges into Impaired Waterbodies:

Section 3.1 – Existing Discharges with No Proposed Increase and a Waterbody Impairment:

The following procedures outline the process for an existing discharge proposing no increase to a subsegment identified as impaired on the IR for a pollutant of concern.

In determining whether a discharge has the potential to cause or contribute to an impairment, the following information, and any other information deemed appropriate, may be taken into account when making this determination:

1) Facility type – A review of the existing activities at the facility will be conducted to determine if these activities have the potential to cause or contribute to further impairment of the receiving waterbody with regard to a specific pollutant of concern.

2) Manufacturing process/facility operations – If applicable, a review of the manufacturing process and facility operations, including raw materials, intermediate products, final products, and additives/catalysts used will be conducted to determine if the pollutant of concern has the potential to be present in the effluent.

3) Discharge type – The permit writer will utilize effluent data or general knowledge of the discharge type to determine if the proposed discharge to an impaired stream may have the potential to contain the pollutant of concern.

4) Current permit –

   a) If the current permit contains technology limitations for the pollutant of concern, at a minimum, these limitations may be retained at current levels in accordance with anti-backsliding regulations. The technology limitations may be based upon either effluent guidelines, secondary treatment standards, Statewide Sanitary Effluent Limitations Policy, area wide policies, or best professional judgment. A reasonable potential analysis may be conducted on a case-by-case basis, depending on the parameter of concern. This analysis shall be conducted on discharges that can reasonably be expected to discharge during critical conditions (low-flow conditions) (i.e., typically this analysis is not conducted for non-process area stormwater discharges). The analysis shall be in accordance with the Permitting Guidance Document for Implementing Louisiana Surface Water Quality Standards, LDEQ, October 26, 2010, or the most recent version. The technology limitations in the current permit will be utilized in this analysis. If the analysis indicates that the technology limitations for the pollutant have the potential to cause or contribute to a violation of water quality standards, water quality based limitations shall be established in lieu of the technology limitations. If the analysis indicates that the technology limitations do not have reasonable potential to cause or contribute to a violation of water quality standards, the technology limitation shall be retained in the permit.

b) If the current permit contains water quality based limitations for the pollutant of concern, Discharge Monitoring Report (DMR) data will be reviewed to determine if there is a consistent presence above detectable levels. The DMR review period may vary between 2 – 5 years depending on the number of data points available. Detectable levels can be defined as the water quality criteria or the minimum quantification level (MQL), consistent with the sufficiently sensitive methods rule. If it is determined that the pollutant is not present at a detectable level, the water quality limitations may be removed, as the pollutant is not considered present in the discharge, or the limitation may revert to the applicable technology limitations. If DMR data shows that the pollutant is present at detectable levels, a reasonable potential analysis shall be conducted for the pollutant using the effluent data reported on its DMRs. If the analysis indicates that the discharge has the potential to cause or contribute to a violation of water quality standards, water quality based limitations shall be established in the permit. If the analysis indicates that the effluent data demonstrated no reasonable potential to cause or contribute to a violation of water quality standards, reporting requirements may be established in the permit, and a reduction in monitoring frequency may be considered.

c) If the current permit has reporting requirements for the pollutant of concern, DMR data will be reviewed to determine if there is a consistent presence above detectable levels. Detectable levels can be defined as the water quality criteria or the MQL, consistent with the sufficiently sensitive methods rule. If it is determined that the pollutant is not present at a detectable level, the reporting requirement may be removed, as the pollutant is not considered present in the discharge. If the pollutant is present at detectable levels, additional evaluation will be necessary. Based on the parameter of concern or the nature/type of discharge, it may be determined that a reasonable potential analysis is necessary. If the analysis indicates that the level of the pollutant in the discharge has the potential to cause or contribute to a violation of water quality standards, a water quality based limitation shall be established. If the analysis does not indicate that the discharge has to potential to cause or contribute to a violation of water quality standards, the pollutant reporting requirements may be removed from the permit. If there is no state criteria for the pollutant of concern, the permit writer will make a determination whether a limitation based on best professional judgment, office guidance, nationally recommended criteria, or 95th and 99th percentile of the effluent data will be established in the permit. Reporting requirements may also be retained if it is determined that additional data gathering is necessary.

d) If limitations or reporting requirements for the pollutant of concern are not in the current permit, a review of the analytical data provided as part of the renewal application will be conducted. If analytical data was not provided for the pollutant of concern, this data may be requested. If the data shows that the pollutant is present at detectable levels, if applicable, a reasonable potential analysis may be conducted using this data. If the analysis indicates that the level of the pollutant in the discharge has the potential to cause or contribute to a violation of water quality standards, a water quality based limitation shall be established. If the analysis does not indicate that the discharge has the potential to cause or contribute to a violation of water quality standards, reporting requirements will be established in the permit to gather data for later consideration. If the analytical data shows that the pollutant is not present at detectable levels, or if there is no criteria for the pollutant of concern, this Office will determine on a case-by-case basis whether to include reporting requirements for further data gathering purposes.

5) Based on the volume of the discharge, proximity to the modeled stream or impaired waterbody, discharge type, etc, it may be necessary to conduct a calibrated or un-calibrated water quality model to determine if the discharge has the potential to cause or contribute to the impairment of the receiving waterbody. The use of a calibrated or un-calibrated model and reaction rates shall be determined on a case-by-case basis using LDEQ's *Louisiana Total Maximum Daily Load Technical Procedures*, LDEQ, February 11, 2016 (or most recent version); *Rates,*

Constants, and Kinetics Formulations in Surface Water Quality Modeling (Second Edition), EPA, June 1985 (EPA/600/3-85-040); *Louisiana's Standard Waterbody Guidelines for Wasteload Allocation Update Modeling*; actual data of the receiving waterbody or a representative waterbody; or best professional judgment.

Section 3.2 – Existing Facilities with Increased Discharges and a Waterbody Impairment

The following procedures outline the process for existing facilities with increased discharges to a subsegment identified as impaired on the IR for a pollutant of concern.

In determining whether a discharge has the potential to cause or contribute to an impairment, the facility type, manufacturing process (if applicable), discharge type(s), current permit, application, applicable guidelines, and any other information deemed appropriate must be evaluated. The information that may be used to make this determination can be found in Section 3.1 Additionally, the following items must also be taken into consideration.

1) Type of discharge – A review of the type of discharge for which the increase is proposed must be evaluated to determine if the increased discharge will cause or contribute to an impairment.

2) Current Permit – A review of the current permit shall be conducted to determine if the permit contains technology limitations for the pollutant of concern. If the current permit contains technology limitations for the pollutant of concern, those limitations shall be retained at currently permitted levels. However, an increase in permit technology limitations may be authorized if it can be proven that the increased limitations will not further contribute to the impairment. This can be demonstrated via a reasonable potential analysis or a water quality model, if applicable, as outlined in Section 3.1. Should the reasonable potential analysis indicate more stringent water quality based limits are required, those limits will be included in the permit. Specifically pertaining to discharges of treated sanitary wastewater, more stringent limitations may be imposed based on policies developed in conjunction with the New Vision process. For example, LDEQ has implemented a policy change, decreasing standard $CBOD_5$ limits, for new/increased discharges in the New River subsegment (040404) based on preliminary water surveys conducted as part of the New Vision. These policies and specific permit language are documented in LDEQ's internal memos to staff.

Section 3.3 – New Discharges into Impaired Waterbodies

New discharges may only be permitted if it can be demonstrated that these discharges will not cause or contribute to further impairment of the receiving waterbody. These discharges will be permitted by following procedures outlined in Section 3.1. For sanitary wastewater, new/increased discharges to an impaired water body, this Office should also consider if the proposed wastewater treatment plant will be providing improved treatment, replacing older facilities, extending the collection system to previously unsewered areas, etc. If an evaluation demonstrates that a discharge will cause or contribute to further impairment to the receiving waterbody, this Office may determine that the discharge will not be permitted/authorized at the levels proposed. As described in Section 3.2, more stringent limits than what is required by the SSELP or Area-wide Policies (see Volume 8) may also be imposed by a policy change in conjunction with the New Vision process. Depending on the parameter, limitations equal to or more stringent than water quality criteria end-of-pipe may be established in the permit. One example of this is the very common scenario of establishing Fecal Coliform limitations based upon criteria. On a case-by-case basis, this Office may deny the application or require the applicant to consider alternatives for handling its wastewater.

<u>Section 4 – Discharges into Subsegments Subject to a TMDL</u>:

In the process of developing an LPDES permit, Volume 8 will be reviewed to determine if the subsegment to which the applicant proposes to discharge is subject to a TMDL. Additionally, Appendix A of the IR will be reviewed to determine if the subsegment is still identified as impaired for the pollutant(s) of concern for which the TMDL was written. Subsegment delineations, descriptions, and applicable designated uses and criteria have been and may be revised, either through a Use Attainability Analysis (UAA) and/or the Triennial Revision Process. In cases where the subsegment number, delineation, or description has changed, the permit writer must carefully review the TMDL to identify the modeled water body(ies) and dischargers given a waste load allocation. Even if the water quality standards have been updated, a TMDL that is applicable to a particular subsegment or water body shall continue to be applied until the TMDL is revised.

Section 4.1 – Establishing a Waste Load Allocation (WLA) in a Permit or Allocating a Portion of the Margin of Safety (MOS)

Determining when to establish a WLA in a permit or allocate a portion of the MOS can at times be somewhat complex. TMDLs vary in the assumptions made in development of the TMDL, in the implementation strategy, and in the TMDL intent. Some TMDLs do not establish a WLA for all dischargers within the segment. These TMDLs may state that not all dischargers were included because they were considered too small or too far away from the modeled stream(s) to have an impact on the impairment. Additionally, some TMDLs only established WLAs for a specific discharge type (i.e. sanitary wastewater discharges or other potentially high BOD discharges). Permit writers will have to evaluate each TMDL individually to determine the intent of the TMDL and how best to implement the requirements.

TMDLs are comprised of 3 basic components: Load Allocation, WLA and MOS. The WLA consists of loadings for permitted point source discharges which have been determined to discharge the pollutant of concern. The MOS is loading allocated to point sources intended to account for future growth and uncertainties associated with the modeling process. Some TMDLs do not specifically define a future growth (FG) component, but only define an overall MOS,while other TMDLs include a separate FG component or the FG component is considered an implicit portion of the MOS. When determining if an existing or new discharger should be assigned a portion of the MOS, the application and TMDL must be reviewed to determine the following:

- The discharges that were considered by the TMDL to potentially have an impact on the waterbody of concern;
- The date that the discharge commenced;
- Whether the outfalls in the application potentially discharge the pollutant of concern;
- The waterbodies/tributaries included or specifically excluded in the model;
- The target waterbody the TMDL has been developed to protect, and
- The overall intent of the TMDL.

The permit writer will review the TMDL and application and consider the following:

1) <u>Permitting Process for Existing Discharges with an Assigned WLA in the TMDL</u>

   a. If a discharge has been assigned a WLA in the TMDL, that allocation shall be established in the permit, unless the TMDL specifically states that WLAs do not need to be established in the permit.

   b. If there is a request for expansion or increase in the flow volume beyond the amount allotted/specified in the TMDL, the permit writer will evaluate whether a portion of the explicit MOS may be allocated. This determination will be based upon whether the segment is still impaired for the pollutant of concern (See Section 3.2.2 above) or if there is MOS remaining.

   c. If the discharge is expanding and there is no explicit MOS remaining or the MOS is very limited, the permit writer shall evaluate if the proposed expansion will serve to consolidate existing discharges or expand the collection system to take in areas that would otherwise require less efficient, on-site wastewater treatment systems. A balance must be struck between utilizing all or most of the MOS and/or potentially denying a facility/municipality the ability to provide centralized utilities to the community. In some cases of very low MOS, LDEQ may opt to initiate a reallocation of the entire point source

WLA among the permittees, resulting in reduced limitations for all dischargers or a certain class of dischargers. See Section 4.1, subsection 3.j.

d. Under certain circumstances, such as permanent decreases in production at industrial facilities or terminations of permit coverage, an assigned WLA may be reduced and/or eliminated and incorporated back into the available MOS.

e. The permit writer will document in the Statement of Basis (SOB) or Fact Sheet (FS) what procedures were taken to implement the TMDL and how much, if any, of the MOS has been allocated.

f. Changes to the MOS, including increases to the MOS based on termination of permits, will be tracked by the Water Permits Division in an internal tracking system. This tracking system will continuously keep a record of all permit issuances, authorizations, modifications and terminations. Due to the continual (i.e. daily) updates to the MOS tracking spreadsheets, these are not publicly available except to be provided as part of a Public Records request. In the event a Public Records request is made, the provided information shall be considered a “snapshot” at a certain point in time and not a certain, unchanging value.

2) <u>Permit Process for Existing and/or Unpermitted Discharges Not Included in the TMDL</u>

The permit writer will review the permit application to determine when the facility’s discharge of the pollutant of concern first came into existence. For example, if there is a dissolved oxygen TMDL for the subsegment and a facility was not included in the WLA, the permit writer will determine when the sanitary outfall listed in the application first began discharging at the site. For existing and/or unpermitted discharges not included in the TMDL, this Office will consider the following:

a. If the facility’s discharge was in existence prior to the development of the TMDL, this Office considers these discharges as part of the Nonpoint Source Allocation, regardless of whether the facility was identified as a point source in the TMDL. No margin of safety will be allocated to the discharge. However, the discharge and loading will be tracked in the MOS spreadsheets (without deducting from the MOS) for any potential updates or revisions to the TMDL and/or Water Quality Management Plan. If the facility’s discharge was not in existence prior to development of the TMDL, see Section 4.1, subsection 3 below.

b. An evaluation (identical to procedures described in Section 3.1) will be made to determine if limitations or reporting requirements for the pollutant of concern are deemed necessary. Recently approved TMDLs, such as those developed for the Lake Pontchartrain Basin include explicit permitting strategies for existing, but previously unpermitted dischargers. In the absence of an explicit strategy, limitations will be established that follow the assumptions and requirements of similar discharges which were included in the TMDL. One example of this would be establishing $CBOD_5/BOD_5$ limitations for a sanitary discharge that are similar to the limitations used in the TMDL’s projection model. For example, a business (not captured in the TMDL) applying for coverage under a Class II sanitary general permit would receive the same limits assigned to another Class II facility included in the TMDL. Also, in following the intent or assumptions made in the TMDL, limitations equal to or more stringent than water quality criteria end-of-pipe may be established in the permit. One example of this is the very common scenario of establishing Fecal Coliform limitations based upon criteria.

c. If the existing facility requests to expand or increase flow beyond the volume it previously discharged, the permit writer will evaluate whether a portion of the explicit margin of safety may be allocated. This determination will be based upon whether the segment is still impaired for the pollutant of concern (See Section 3.2, subsection 2 above), or if there is MOS remaining. The permit writer will also map the proposed location of the outfall and determine if the outfall is/will be discharging to a modeled water body, and if not, evaluate the connectivity and distance to the modeled water body. (See Section 4.1, subsection 3.d-j below).

d. The permit writer will document in the Statement of Basis (SOB) or Fact Sheet (FS) what procedures were taken to consider the TMDL and how much, if any, of the MOS has been allocated. Changes to the MOS will be tracked by the Water Permits Division in an internal tracking system. This tracking system will continuously keep a record of all permit issuances, authorizations, modifications and terminations.

3) Permitting Process for Discharges Which Were Not Existing Prior to the TMDL or Have Proposed Increase after the TMDL:

Permits/applications in this scenario include the following:

- Proposed facilities,
- Existing facilities which began discharging the pollutant of concern before issuance of the TMDL but have requested an increase in the discharge (for example, an existing POTW requesting to increase design capacity, or an existing industrial facility requesting an increased load due to a production expansion); and
- Existing facilities which began discharging the pollutant of concern after issuance of the TMDL, (for example, an industrial facility proposing to add a new outfall for treated sanitary wastewater).

If the facility's new, proposed, or expanded portion of the discharge was not in existence prior to the TMDL, the permit writer will evaluate the TMDL and the application for the following:

a. Determine if the discharge type(s) from the facility has the potential to contain the pollutant of concern. If it does, further evaluation is necessary to determine what requirements should be established in the permit. (See procedures described in Section 3.1)

b. Consider if the facility has a proposed or new wastewater treatment plant which will be providing improved treatment, replacing older facilities, or extending the collection system to previously unsewered areas, etc. In these scenarios, several TMDLs have specific requirements. Also, case-by-case considerations may be made to accommodate these discharges.

c. Evaluate the intent of the TMDL to determine whether the discharge from the facility is similar to those facilities that were included in the TMDL. For example, if the TMDL only considered outfalls with BOD_5 limitations, outfalls from the applicant which may have BOD_5 limitations may be considered to have an impact. In these situations, the permit writer will follow the assumptions and requirements of similar discharges which were included in the TMDL, and, at minimum, establish limitations for BOD_5 which are similar to the limitations used in the TMDL's projection model. Also, the permit writer will evaluate whether the TMDL considered all discharges of the pollutant of concern, or just discharges in a particular area of the segment. Further, a portion of the MOS may be allocated to the facility if other criteria allow it (See Section 4.1, subsection 3.d-j below).

d. Evaluate the TMDL to determine what waterbody it is intended to protect, and what waterbodies and tributaries (if any) were included in the model. Also determine if some waterbodies were specifically excluded from the model.

e. Evaluate the discharge location and determine if it flows directly to the modeled waterbody, a modeled tributary, or a waterbody which was specifically excluded from the TMDL. If the facility discharges to an unnamed ditch or tributary which was not included in the model, the permit writer will create a map to measure the distance to a modeled tributary or the modeled waterbody of concern.

f. Evaluate the discharge volume to make a determination regarding the potential to reach the modeled waterbody or tributary.

g. Determinations regarding discharge potential to reach a modeled waterbody will be made on a case-by-case basis, taking into consideration discharge flow, distance from modeled waterbodies, the specific waterbodies modeled in a TMDL, the size of the waterbody or ditch to which the discharge initially flows, the number of new or remote discharges in the subsegment, etc.

h. Based upon the distance and size evaluation, this Office may determine that the discharge is unlikely to reach the modeled waterbody(s) and will have negligible impact on the modeled waterbody(s). In this permit situation, no MOS will be allocated to the discharge and it will be considered part of the Nonpoint Source Allocation. However, an evaluation will be made to determination what limitations or reporting requirements for the pollutant of concern are deemed necessary. The permit writer will follow the assumptions and requirements of similar discharges which were included in the TMDL and establish limitations which are similar to the limitations used in the TMDL's projection model.

i. If it is determined that the new or increased discharge may reach and impact the modeled waterbody(s), a portion of the MOS may be allocated if available, unless the TMDL specifically prohibits increased loading from new discharges.

j. If it is determined that the new or increased discharge may reach and impact the modeled waterbody(s), but there is no explicit MOS remaining, or very limited MOS remaining, one or more of the following may be necessary:

- Consideration should be made regarding whether the expanding or new facility has a proposed or new wastewater treatment plant which will be providing improved treatment, replacing older facilities, or extending the collection system to previously unsewered areas, etc. In these scenarios, several TMDLs have specific requirements. Also, case-by-case considerations may be made to accommodate these discharges.
- Small discharges of treated sanitary wastewater (e.g. subdivision package plants) may also consider "no discharge" options, such as a retention pond designed not to discharge, except during 24-hour, 25-year rain events. Ponds must be designed to retain both storm water and effluent. Other experimental systems may also be considered, with input from the Louisiana Department of Health (LDH). LDEQ will also consider approving very small discharges (usually 1500 GPD or less) of treated sanitary wastewater that utilize LDH approved effluent reduction devices, which rarely discharge during critical conditions.
- Review the TMDL discharger inventory to determine if there is available loading from the WLA due to closure of facilities that were assigned a portion of the WLA.
- A water quality model may be performed to determine if additional loadings as the result of the discharge can be permitted.
- Conduct a reasonable assurance determination to determine if a portion of the LA may be reallocated to an expanded or new discharge.

- Reallocate the existing WLA, or the allocated MOS across the modeled areas of the segment, providing more stringent limitations for all facilities.
- Revise the TMDL.

k. The permit writer will document in the Statement of Basis (SOB) or Fact Sheet (FS) the evaluation and conclusions made in consideration of the TMDL and how much, if any, of the MOS has been allocated. Changes to the MOS will be tracked by the Water Permits Division in an internal tracking system. This tracking system will continuously keep a record of all permit issuances, authorizations, modifications and terminations.

4) Water Quality Trading:
With the implementation of a Water Quality Trading Program, the applicant for a new or increased discharge may enter into a point source to point source trade agreement with other existing sources. All water quality trading transactions will be conducted in accordance with applicable regulations and guidance. A net decrease in pollutant loading must be demonstrated in order to meet the intent of the TMDL.

5) Updates to the Water Quality Management Plan:
Changes to the MOS or a redistribution of a waste load allocation amongst permittees specifically included in the TMDL are considered revisions to the Water Quality Management Plan, Volume 8: *Wasteload Allocations/Total Maximum Daily Loads and Effluent Limitations Policy*. The Water Permits Division will public notice updates to the Water Quality Management Plan in accordance with the LAC 33:IX.1119.B.1-Implementation of Louisiana's Water Quality Management Process and LAC 33.IX.3113 - Public Notice of Permit Actions and Public Comment Period. This Office will provide public notice of the following:

- Updates to the WLA/MOS summary tables for each TMDL spreadsheet, demonstrating how much MOS has been used and is remaining, will be public noticed quarterly. Updates to the MOS as a result of individual permit issuances and terminations, general permit authorizations of coverage and terminations of coverage, will be captured in the public noticing of these summary tables.
- Summaries of models created by the Water Quality Assessment Division and specific changes to an existing WLA (i.e. increasing or decreasing a facility-specific WLA established in a TMDL) will be public noticed as an update to the WQMP in conjunction with the public notice of the draft individual permit.

Section 4.2 – Discharges Subject to a TMDL for Which the Criteria Has Changed:

All discharges shall be evaluated using criteria as listed in the most recent revision of the Louisiana Administrative Code, Title 33, Part IX, Chapter 11 (LAC 33:IX.1113). TMDLs that have been issued prior to a criteria revision that do not account for the revision may lead to permit limitations more stringent than necessary to comply with the current criteria. Should it be determined that a facility has been assigned a WLA in a TMDL that has criteria not consistent with the values listed in the most recent version of LAC 33:IX.1113, that WLA may not be established in the permit. In lieu of establishing the WLA, the discharges may be evaluated using the criteria listed the most recent revision of LAC 33:IX.1113 and the receiving subsegment's status in the current IR.

If the receiving subsegment is not listed in the current IR as impaired, limitations may be calculated in one of the following ways.

1) Technology based limitations – If the facility is subject to guidelines which limit the pollutant(s) of concern, limitations will be calculated in accordance with those guidelines. On a case-by-case basis a reasonable potential analysis may be performed.

2) No limitations in the current permit – If the current permit does not contain limitations for the pollutant of concern and the pollutant is determined to be present, limitations may be calculated

in order to perform a reasonable potential analysis. Mass limitations may be calculated using the current criteria and the applicable discharge flow. A reasonable potential analysis may then be conducted using the calculated limitations.

If the receiving subsegment is listed as impaired on the current IR for the pollutant of concern for which the TMDL was written, the discharges from the facility shall be evaluated in accordance with the procedures outlined in Section 3 of this document.

Conclusion:

Should updates to Volume 8 be required as a result of revised WLAs for a TMDL, those updates will be published on a quarterly basis. Additionally, the updates will be submitted to EPA and will go through the public participation process.