

Implementation Strategy 1.0: Wastewater Treatment Facilities (WWTF)

Although bacteria is found in fecal waste of all warm-blooded animals, it is the intent of the BIG to focus resources on bacteria from human sources.

[Because of the complexity of terms used to describe pathogens and indicators thereof, the terms bacteria and indicator bacteria may be used to include *E. coli* and Enterococcus...]

In Texas, the level of bacteria loading from Wastewater Treatment Facilities (WWTFs) is largely unknown as they have not been required, by permit, to test for bacteria, with the exception of facilities utilizing an ultraviolet disinfection system. However, non-compliant WWTFs were designated in the Clear Creek TMDL as one of the most probable sources of bacteria in the region's waterways (Texas Commission on Environmental Quality, 2008). Results from limited monitoring of bacteria in the BIG region suggests that while levels of indicator bacteria in effluent from individual WWTFs is typically low, at any given time approximately five to ten percent of the facilities can be found to be exceeding the single-sample criterion for *E. coli* (Texas Commission on Environmental Quality, 2009).

As of June 1, 2010, the BIG region has 707 domestic WWTFs and 136 industrial WWTFs, most of which are permitted for less than 0.5 million gallons per day (MGD) (See Table 1) and, when not dominated by storm water, flow in many of the region's waterways is dominated by wastewater effluent.

Table 1.

Permitted Flow (MGD)	Number of Domestic WWTFs (% of Domestic Facilities)	Number of Industrial WWTFs (% of Industrial Facilities)
0 to less than 0.1	224 (32%)	52 (38%)
0.1 to less than 0.5	196 (28%)	34 (25%)
0.5 to less than 1	143 (20%)	13 (10%)
1 to less than 5	108 (15%)	25 (18%)
5 to less than 10	22 (3%)	5 (4%)
10 or greater	14 (2%)	7 (5%)

Possible sources of bacteria from a WWTF include:

- Insufficiently treated effluent
- Unauthorized/accidental discharge, including sludge

Implementation Activity 1.1:

Impose more rigorous bacteria monitoring requirements

Until recently WWTFs in Texas were not required to monitor for bacteria, with the exception of facilities using an ultraviolet disinfection system. However, the TCEQ recently came to an agreement with the EPA and adopted a new rule requiring that all domestic wastewater draft

permits, for which Notice of Application and Preliminary Decision is published on or after January 1, 2010, be updated to include monitoring requirements for bacteria at a specified frequency (*see* Table 2). It will take five years for all domestic wastewater permits to be updated.

In order to move towards compliance with contact recreation standards in the region’s waterways, it is imperative to have more information about WWTFs’ operations. As such, the BIG recommends that the frequency of monitoring be increased over what is currently required by TCEQ.

According to current regulations, 224 domestic WWTFs in the BIG region are required to monitor bacteria quarterly and 196 domestic WWTFs are required to monitor monthly. Domestic WWTFs in the BIG region will instead be required to monitor bacteria on similar frequencies as are other parameters of their TPDES permits, up to five times per week. If a domestic permit does not specify a sampling frequency for bacteria, the permittee should follow the frequencies set forth in Table 3. Currently, the cost to run a bacteria sample is estimated at approximately \$50.

Larger flows are given more frequent measurement requirements than small flows, reflected in the current Texas requirements in Texas for domestic WWTFs, Table 2, based on pollutant loadings (Texas Commission on Environmental Quality Factual Basis for Proposed Rule). Table 3 suggests increased sampling frequency for smaller flows to increase the operational database. Over time, the increased database will help operations understand the effects of variables such as rainfall and infiltration. In addition, this data could greatly improve load reduction because operators will have more information that allows plant operators to adjust and control plants to reduce bacteria levels. The additional data may also protect all large and small flow WWTFs who remain compliant from more stringent regulations that could be imposed if receiving stream quality fails to improve. Frequencies shown in Table 3 could be increased, depending on the WWTF’s performance, other site sampling frequencies and the impairment of the receiving stream.

Table 2. (30 Texas Administrative Code §319.9(b))

Permitted Flow (MGD)	<i>Current requirements in Texas for domestic WWTFs</i>		
	Chlorine systems	Ultraviolet systems	Natural systems
0 to less than 0.1	1/quarter	5/week	1/month
0.1 to less than 0.5	1/month	5/week	2/month
0.5 to less than 1	2/month	Daily	1/week
1 to less than 5	1/week	Daily	3/week
5 to less than 10	3/week	Daily	5/week
10 or greater	5/week	Daily	Daily

Table 3(proposed to replace the above Table 2).

Permitted Flow (MGD)	<i>Proposed requirements for domestic WWTFs in the BIG project area</i>		
	Chlorine systems	Ultraviolet systems	Natural systems
0 to less than 0.1	1/week	5/week	3/week

0.1 to less than 0.5	1/week	5/week	3/week
0.5 to less than 1	3/week	Daily	3/week
1 to less than 5	3/week	Daily	3/week
5 to less than 10	5/week	Daily	5/week
10 or greater	5/week	Daily	Daily

Note: Highlighted values are *proposed*.

New bacteria monitoring regulations, in 30 TAC §319.9(b), allow for a reduction in frequency of bacteria monitoring for permittees with at least twelve months of uninterrupted compliance with its permit limit, as determined by data collected by TCEQ and local governments. The same allowance and possible consequences for violation of the permit limit could apply in the project area.

TCEQ procedures specify that effluent limits and monitoring requirements for bacteria associated with industrial discharges will be determined on a case-by-case basis (Water Quality Division - Texas Commission on Environmental Quality, 2010). If TCEQ elects to include bacteria limits or monitoring in a permit for an industrial facility, the BIG recommends that TCEQ take into consideration the bacteria limits and monitoring guidelines specified by the BIG for domestic WWTF permits. TCEQ shall also consider the characteristics of both the waste stream and the receiving water body, particularly when the stream is impaired for bacteria.

Implementation Activity 1.2:

Impose stricter bacteria limits for WWTF effluent

TCEQ adopted a rule on November 4, 2009, requiring that all TPDES domestic wastewater permits be updated to include bacteria limits for all WWTFs. New regulations state that “by adopting bacteria limits, there will be a more direct and possibly more accurate measure of the level of disinfection achieved in domestic effluent discharged to both fresh and salt water” (Texas Commission on Environmental Quality). Current regulations have set the monthly geometric mean bacteria effluent limit and the daily maximum bacteria effluent limit at the most stringent contact recreation category level (Texas Commission on Environmental Quality).

However, effluent limits set in the regulations should be made more stringent for WWTFs that discharge into bacteria-impaired watersheds to which the contact recreation standard applies if the waterways are to comply with those standards. In fact, the approved Buffalo and Whiteoak Bayous TMDL states, “if WWTFs were to discharge at the water quality criterion (126 MPN/100mL), there would be no capacity to accommodate other loads and existing downstream discharges” (Texas Commission on Environmental Quality, 2009).¹ Therefore, for domestic facilities releasing effluent into freshwater, the BIG resolves that bacteria limits in domestic WWTF permits throughout the BIG region be set at 63 MPN/100mL for the geomean of the monthly samples² of *E. coli* effluent, using any method approved under 40 CFR Part 136, and

¹ The Buffalo and Whiteoak Bayous TMDL and other TMDLs proposed and anticipated in the BIG region specify that *E. coli* limits for WWTF effluent be one half of the water quality criterion, currently 63 MPN/100mL, in calculations of the WWTF Waste Load Allocation.

² After identifying and rejecting outliers, consistent with ASTM E 178-80, "Standard Practice for Dealing With Outlying Observations" (Section 14.02, General Methods and Instrumentation - General Test Methods; Forensic Sciences: Terminology; Conformity Assessment: Statistical Methods).

197 MPN/100mL for the daily maximum *E. coli* effluent limit. The authority to set these stricter limits was given explicitly in the TCEQ rule itself, where it states “the commission may impose more stringent requirements in permits than those specified..., on a case-by-case basis, where appropriate to maintain desired water quality levels or protect human health” (Texas Commission on Environmental Quality). As allowed for in the Buffalo and White Oak Bayou TMDL, the BIG resolves that the bacteria limit be set at the 126 MPN/100 ml geomean of the monthly samples at a WWTF’s next permit renewal or major amendment and that the new limit be phased in, such that three years after the permit’s effective date the effluent limit shall be 63 MPN/100 ml geomean of the monthly samples. This phased in approach would allow the WWTFs to implement *E. coli* monitoring while each plant plans and implements processes to address *E. coli* discharges.

TCEQ has developed criteria for actual classified stream segment testing using *E. coli* as the indicator bacteria for freshwater and *Enterococci* for saltwater per Appendix A of 30 TAC §307.10(1). Fecal coliform can still be used as an alternative indicator during the transition to the new indicator bacteria, as specified in 30 TAC §307.7(b). For domestic facilities where TCEQ determines that *Enterococcus*, rather than *E. coli*, is the appropriate indicator bacteria, the BIG resolves that the *Enterococcus* effluent limit be set at 23 MPN/100mL for the geomean of the monthly samples³ and 57 MPN/100mL for the daily maximum, using any method approved under 40 CFR Part 136.

Implementation Activity 1.3:

Increase compliance and enforcement by TCEQ

Stakeholders are concerned that there are an insufficient quantity of investigations, reviews, and enforcement being performed by TCEQ. The BIG recommends that TCEQ conduct unannounced and focused inspections with a goal to have all facilities inspected every two years. There are multiple methods to address the low numbers of investigations and reviews performed. One method would be to increase staff performing investigations, either through hiring additional TCEQ staff or through a contract with local programs, and another would be to change TCEQ operating procedures.

1.3.1 Allow unannounced inspections and focused investigations on all facilities, including sampling-only investigations. Currently, unannounced inspections can be performed at WWTFs that have been designated as a poor performer or in response to complaints and other similar situations. In the BIG region only one facility has been so designated. Unannounced inspections have been shown to increase compliance (see, e.g., Texas Department of State Health Services, 2007). The BIG assumes that unannounced WWTF inspections would yield similar results.

In addition to the restrictions on whether inspections must be announced, there are restrictions on the types of investigations that may be performed. For example, Comprehensive Compliance Inspections are required for non-complaint generated inspections of major facilities (permitted flow of greater than 1 MGD) and can take days to complete. This severely limits the number of

³ After identifying and rejecting outliers, consistent with ASTM E 178-80, "Standard Practice for Dealing With Outlying Observations" (Section 14.02, General Methods and Instrumentation - General Test Methods; Forensic Sciences: Terminology; Conformity Assessment: Statistical Methods).

inspections. TCEQ should instead allow for and conduct focused investigations including inspections that just collect samples at all facilities. An investigator could then conduct numerous inspections in a single day. Currently, focused investigations are permitted only at discretionary minor facilities, those with a permitted discharge of less than 1 MGD.

For facilities that are not currently staffed, the BIG recommends that TCEQ develop a procedure to facilitate these inspections and investigations. For example, TCEQ could require access within a defined, restricted period of time after receiving notice by telephone to a posted number.

1.3.2 Consider increasing TCEQ staff or contract with local programs to increase inspections and reviews. TCEQ should perform a workload analysis to correlate recent increases in wastewater fees from the regulated community to the allocation of staff for inspections and enforcement. If that analysis concludes that more staff is necessary, TCEQ should hire additional employees. An alternative to hiring additional TCEQ employees would be to contract with local programs, as is done by the TCEQ Air and Waste programs, to take on additional duties such as the review of plans and specifications or the review of Discharge Monitoring Reports (DMRs).

Increasing TCEQ staff or contracting with local programs would help ensure all plans and specifications are reviewed, a greater number of WWTFs are inspected each year, and DMRs are reviewed on a more frequent basis.

Implementation Activity 1.4:

Improved Design and Operation Criteria for New Plants

Much of the existing design and operation criteria was improved in 2008 when 30 TAC § 217 (formerly (§ 317)) was adopted as the Design Criteria for Domestic Wastewater Systems. As a greater understanding of how plant design impacts bacteria outputs from plants is achieved, the BIG recommends that local governments reopen discussion of design criteria in the near future and consider whether adopting stricter requirements within their jurisdiction would be appropriate.

Implementation Activity 1.5:

Upgrade Plants

Bacteria monitoring may reveal plants that are not meeting standards. Upgrades or repairs, as appropriate, will be the responsibility of each individual plant in order to comply with their permit. Some types of facilities may have more trouble than others in meeting bacteria standards. These facilities may need to undertake an intensive redesign. Grants, although generally not great in size, may be available. Possible sources of funding include:

- EPA via the Texas Water Development Board – Clean Water State Revolving Fund Program
- U.S. Department of Commerce – Economic Development Grants for Public Works and Development Facilities
- U.S. Department of Agriculture – Rural Utilities Service Water and Waste Disposal Program

- U.S. Department of Housing and Urban Development – State Community Development Block Grant Program

Implementation Activity 1.6:

Consider Regionalization of WWTF

Notwithstanding TCEQ and local enforcement authority, wastewater treatment plants that are chronically or severely out of compliance with the bacteria limits set in their TPDES permit shall be encouraged to address the problems through operational improvements and/or capital improvements. If the plant continues violating bacteria limits set in their TPDES permit, the BIG encourages TCEQ or any local government with jurisdictional authority to require WWTF to evaluate plant regionalization and implement as appropriate. If regionalization is not a viable alternative, the plant should be required to be modified to meet higher design and monitoring standards.

Implementation Activity 1.7:

Use treated effluent for plant irrigation

Many domestic WWTFs currently do not use their effluent for purposes of irrigation of plant grounds. Using effluent for plant irrigation will allow the water to trickle through the grass and soil filtering out additional pollutants. Each domestic WWTF is required to consider the use of treated effluent for plant irrigation purposes and is encouraged to incorporate its use as appropriate prior to the next renewal of their permit.