

The Gulf of Mexico – Florida’s Toilet

How sewage discharges are fouling Florida’s Gulf of Mexico tributaries, estuaries and coastal waters

Clean Water Network of Florida

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About Clean Water Network of Florida

The Clean Water Network of Florida opened its doors in November 1994 as part of the national Clean Water Network in Washington, DC. It grew in membership from a handful of mostly national affiliate groups located in Florida to over 200 organizations and many thousands of individual members today. In November 2005, the CWN of FL became a separate, independent entity, and a project of the Tides Center. Over the past 14 years since the Clean Water network of Florida began operation, there has been a concerted effort by polluter-backed political forces to undermine environmental laws on a state and local level, more quietly and covertly, where there is often less sophistication and fewer resources to recognize and resist these efforts. The Clean Water Network of Florida has been on the front line for the past 14 years in Florida, defending clean water laws on both the state and federal levels; educating the public about the importance of these laws; working with local communities and teaching them to effectively participate in decision-making in their communities; and bringing groups together across the state to win some of the most significant environmental victories in Florida in the past decade or longer.

Acknowledgements

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We would also like to acknowledge the financial contributions from our members, which made this report possible. Thank you to everyone who has contributed to our efforts.

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Introduction

Florida's coastal waters on the Gulf of Mexico are in trouble. According to the 2007 EPA Gulf of Mexico National Estuary Program Coastal Condition report, every program estuary on Florida's gulf shows degradation, with the main culprit cited as being "excess nitrogen pollution and stormwater runoff."

Water quality along Florida's environmentally and economically valuable beaches and bays suffers from algae blooms, including red tides; decreasing fisheries; loss of seagrass beds, oxygen levels too low to support life, and waters often filled with toxins and bacteria harmful to humans and aquatic life.

"Observations have confirmed that our nation's coastal waters are stressed," said Conrad C. Lautenbacher, director of the federal National Oceanic & Atmospheric Administration. "The potential for serious degradation in most of our estuaries necessitates that we reinvigorate efforts to address nutrient pollution" (NOAA 2007).

Coastal nutrient pollution has also been linked to increases in the intensity and duration of "red tides," periodic blooms of a marine alga that causes fish kills, low water oxygen conditions, marine mammal die-offs, human health problems, as well as economic losses. Sewage pollution, along with overuse of fertilizers, livestock waste and other nutrient pollutants combine to create ideal conditions for these blooms. Just one harmful algal bloom event can cause millions of dollars in losses to local coastal communities.

The causes of this over-nutrication are many, and include overuse of fertilizers and industrial discharges. However, a significant contributor to this problem is the many millions of gallons of essentially untreated, or poorly treated sewage that is discharged into our surface and ground waters every day. In a 2004 report on Florida's wastewater program, the Levin College of Law researchers said, "Domestic wastewater facilities are considered to be one of the most serious sources of pollution interfering with the beneficial uses of surface waters."

Whether from septic tanks, small "package plants" that serve one subdivision, wastewater reuse systems, sprayfield discharges, older wastewater treatment plants, or even due to mechanical failures in "advanced" systems, the amounts of contaminated sewage finding their way to the Gulf have truly made it Florida's toilet.

In 2005 Florida's swimming beaches had 3,428 days of beach closings and health advisories due to high levels of bacteria found in sewage, posing a threat to human health and our state's \$41.6 billion beach-related tourism industry.

The public is also losing its shellfish resources. According to a sampling of Florida Department of Agriculture and Consumer Services Shellfish Division condition reports, during a period of average rainfall in April 2008, about half of the state's "conditionally approved" shellfish areas on Florida's Gulf Coast were "closed" to shellfishing, due to presence of fecal bacteria in estuarine water samples.

The public assumption is that raw sewage is piped to a wastewater treatment plant, and all of its contaminants removed by treatment technology. The reality is that most of Florida's sewage collection and treatment systems either do not treat wastewater to a high enough standard in the first place, or because of accidents, poor maintenance, or overloaded systems, they allow a large number of bacteria, toxins, nutrients and other contaminants to enter the environment. For example, "spray irrigation" of treated wastewater that is high in nutrients regularly spew millions of gallons into surface and groundwater, where they may pollute water bodies or contaminate drinking water supplies.

Septic tanks, which are increasing in use, instead of decreasing every year in Florida, hardly treat the sewage at all. Secondary treatment does not remove all the excess nutrients, pathogens and toxins. And all the systems that handle human sewage, especially the older ones, are plagued with mechanical failures, leaking pipes, and other problems that cause contaminated wastewater to be released directly into the environment on a frequent basis. The chances of a system owner getting fined or other enforcement penalties for these spills are slim to none.

In Lee County, 22 of the county's 80 sewage plants continued to send sewage into water bodies that empty into Charlotte Harbor, even after receiving warnings from DEP to repair malfunctioning equipment. The frequency of wastewater violations earned Lee fourth place, out of the 67 counties in the state, for wastewater plant violations (Morales 2008).

According to a study done by Environment Florida, 60% of the major facilities with Clean Water Act discharge permits in Florida exceeded their permitted pollutant limits in 2005.

More than 5 million gallons of sewage spilled in Duval, Hillsborough and Lee counties alone in 2003 (NRDC 2004). In the Florida Keys, the EPA estimates that the 24,000 septic tanks and 8,000 cesspits alone discharge over 1,200 lbs. of nitrogen and 326 lbs. of phosphorus every day, accounting for over half of the total nutrients entering marine waters in the Keys. (Darden 2001)

Sewage is not a minor risk; it is highly toxic. In addition to excess nutrients, it may contain a host of pathogens, including bacteria that cause dysentery and cholera; viruses that cause hepatitis; disease-causing protozoan such as *Cryptosporidium* and *Giardia*; and intestinal worms. Sewage also contains a chemical laboratory full of toxins, either originally in the sewage itself, such as those ingested in pharmaceuticals, or a byproduct of the treatment process, such as chlorine compounds. While treatment may remove most of these hazards, many may survive secondary systems or accidental releases.

Human health can be affected when sewage ends up in the water we drink or swim in. Each year, 1.8 million to 3.5 million illnesses in the U.S. are caused by swimming in water contaminated by sewage, and an additional 500,000 from drinking contaminated water. Sewage-contaminated shellfish cause medical expenses ranging from \$2.5 million to \$22 million each year (NRDC 2004).

Recognizing the problems posed by sewage discharges into water bodies and groundwater, the Southwest Florida Water Management District recommended in 2007 that all wastewater treatment facilities convert to Advanced Wastewater Treatment (AWT) by their next permit renewal cycle.

To ascertain the enormity of this wastewater contamination problem, and what, if anything, is being done to correct or prevent it, Clean Water Network of Florida (CWN of FL) reviewed hundreds of Florida Department of Environmental Protection (FDEP) files of wastewater treatment plants, reuse systems, and other facilities that create treated wastewater effluent that could potentially end up in the Gulf.

Our goal is to make the public more aware of what is happening to the sewage in citizens' own communities, and also to enlist them in our efforts to demand that the state, federal and local agencies to do more to enforce the current wastewater rules, and to require more facilities to upgrade their levels of treatment.

The data in this report represents information obtained from approximately 2003 to 2008. Permit expiration dates do not necessarily indicate that the plant is no longer permitted; its permit may have been renewed after we reviewed the file. We have also included a summary of some facilities' compliance record. We primarily looked at compliance records for facilities with at least one million gallons per day of treatment capacity. If there are no comments in the compliance/violations column on the spreadsheet, it does not necessarily mean there were no violations. The compliance files may not have been available for some reason, or they just may not have gotten recorded.

We want to emphasize that due to the enormous size of some of the compliance files, this report only contains enough information to form a generalized characterization of each facility's record. We strongly encourage anyone who would like more information to consult the files at the district and branch offices of the Florida Department of Environmental Protection.

Findings

From 2006 to 2008, we reviewed wastewater treatment records at the Ft. Myers, Tampa, Jacksonville and Pensacola district offices of the Florida Department of Environmental Protection, firstly, to determine how well Florida's wastewater treatment facilities along western Florida were accomplishing their purpose—preventing harmful materials from sewage from entering the environment, and secondly, to better understand the amount of untreated or partially treated sewage wastewater that is being released into surface and groundwater, and likely to eventually end up in the estuaries and coastal waters of the Gulf of Mexico. The time period studied was roughly 2003 to 2008.

Wastewater treatment plants

In Okaloosa County the Destin Water Users WWT effluent included prohibited levels of fecal coliform bacteria, nitrates, and heavy metals. In Manatee County, the city of Palmetto WWTF frequently discharges toxin-laden effluent into an aquatic preserve. In Key West, effluent with levels that violated standards for copper, cyanide, and dissolved oxygen were injected into the groundwater.

A history of mechanical failures, routine exceedances of water quality standards, leaky pipes and accidental spills were found to be the rule, not the exception, for wastewater treatment. Considering the records of only the 95 WWTPs with permitted capacities of 1 mgd or more, at least 65 (68%) were found to have a record of frequent and serious violations. And considering that records were not available to us for some of the plants where the compliance record is left blank in our text, the actual number of major plants with sewage pollution records, if fully known would actually be much higher.

From Pensacola to the Florida Keys, raw or partially treated sewage spews out of wastewater treatments systems. Of all the counties, Pinellas, perhaps due to an aging WWT system, showed the highest percentage with violations—100%, with all ten of its WWTPs over 1 mgd capacity showing everything from excess nitrogen to chronic toxicity of their discharges.

One plant, the City of Clearwater WWT, which discharges its effluent into Old Tampa Bay, has had numerous spills containing chemicals toxic to aquatic organisms. Pinellas County's South Cross Bayou plant was one of the few that had violations so frequent and persistent that it encountered DEP enforcement more stringent than the usual "consent order." With numerous discharges of raw sewage in 2006-2007, DEP assessed a \$30,000 penalty. In next-door Hillsborough, 7 of its 8 large plants have similar problems and records.

In Sarasota, a county that prides itself on its efforts to prevent excess nutrients entering its water bodies, where they may cause or exacerbate harmful algae blooms, the 1.78 mgd Gulf Gate AWWTP has had frequent and persistent problems meeting limits for nitrogen, ammonia and toxins.

The records for smaller plants are no better, showing about the same rate and types of problems. For example, the 0.115 mgd WWT in the City of Everglades showed numerous violations in

2005 for flow, TSS, coliform, TRC, nitrogen, and BOD. A small plant in Walton County, the 0.075 mgd of the City of Paxton, has an extensive history of nitrate and fecal coliform violations.

In rural Wakulla County, citizens are frustrated and angered over frequent beach closures and a high incidence of illnesses suspected to originate with unsafe swimming waters around Wakulla. While the local sewage treatment plant seems okay on paper, there are frequent spills and overflows from manholes. Recently local concerned citizens convinced the county government-owned plant to drop smoke bombs in several manholes to test for leaks in the collection lines. As suspected, the smoke was detected coming out under homes and from numerous locations from where it should not have been able to escape. This was an inexpensive way to get clear indications that the sewage could be leaking.

To make matters worse, Wakulla Springs is overgrown with plants that are feeding on nutrients that are getting into the spring from the City of Tallahassee's sprayfield – located many miles to the north. While the City of Tallahassee has promised to upgrade its facility, that improvement is several years away – a delay that is technically unnecessary.

Are such problems inevitable? No. It's a matter of making compliance a priority. Hurlburt Field Air Force Base's 1 mgd plant has had zero violations during the time period studied. It has such a good record for compliance that DEP gave it an award of excellence in 2006. Its military base status is apparently no guarantee of compliance. The nearby Naval Air Station in Pensacola shows a history of frequent violations.

Sprayfields

Seen by some as a better means of disposing of treated wastewater effluent rather than discharging into surface waters, sprayfields often create additional problems. Like other forms of disposal, low treatment standards (secondary treatment and basic disinfection, pH control) and system malfunctions in combination create a threat to water quality. We found many violations of standards, such as spills, violations of BOD, coliform and phosphorus (City of Lynn Haven). The City of Crestview sprayfield had numerous spills and leaks into Juniper Creek, TSS and fecal coliform violations. Spills and numerous nitrogen, phosphorus and other violations were found at the South Santa Rosa Utilities sprayfields.

But even if there were no violations, land applications for disposal or irrigation uses of reclaimed water, when using water treated only to the secondary level, may involve water containing a host of pathogens, nutrients, and toxins that survive the secondary process (EPA 2008, Rose 2004).

Septic tanks

While not a part of this study, it is important to note the impact of septic tanks on water quality. These systems are primarily used by single family homes in areas where municipal sewage is not available. Even after sewerage becomes available, homeowners often resist switching over to it, because of high hookup fees from the service provider.

Septic tanks provide very little treatment, which is typically limited to the separation of solids and decomposition by bacteria. They are frequently not maintained, and are prone to leakage and failure, contaminating both surface and groundwater.

Their numbers are already huge, and are growing. According to the Lee County Health Department website, “In Florida, 31% of the population is served by estimated 2.3 million onsite sewage treatment and disposal systems (OSTDS). These systems discharge over 426 million gallons of treated effluent per day into the subsurface soil environment.”

In Florida, “onsite treatment and disposal systems” are primarily regulated by the Florida Department of Health. It would seem that as Florida becomes more and more urbanized that the use of septic tanks would decrease. However, according to DOH records, installations of new septic tanks went from 2,139,864 in fiscal year 1993-1994, in steadily increasing numbers, to 2,640,036 in 2006-2007—with undoubtedly profound implications for water quality, aquatic organisms, the shellfish industry, and human health.

Additionally troubling is DOH data showing that during this same period, despite the increasing number of septic tanks, permits for repairing these systems have actually gone down—from 21,319 in 1993-1994 to 16,057 in 2006-2007.

Underground Injection and RIBs

Like spray irrigation, the lower standards required for these methods of underground disposal are driving an increase of their use, causing major problems for the quality of groundwater and springs. Studies have shown that large nitrogen loadings from these wastewater facilities are a major source of elevated nitrates in some of Florida’s springs (Evans 2004). Groundwater migrates, often mixing with surface waters, so those water bodies are also affected. The same pathogen, nutrient, and toxin issues that exist with sprayfields and water reuse irrigation apply, if the wastewater disposed of is treated only to the secondary level. The injection well in Punta Gorda is causing nitrogen loading to the groundwater. The combined UIC and land application at Rotunda West in Charlotte County has two consent orders for disinfection, pH, fecal coliform, pond overflows and other violations.

Enforcement

Wastewater treatment system violations are probably the least enforced infractions in the state of Florida. Our studies showed the vast majority of plants treating 1 mgd or more had frequent spills or chronic failures to stay within the allowable limits for pollutants discharged.

Enforcement, if any, usually amounts to a “consent order”, whereby the offender entity agrees to fix the problems by a certain date, and/or pay a small fine, which is usually set so low, it’s usually cheaper to pay the fine than fix the problem.

In a 2004 consent order with Sanibel Bayou Utilities, DEP found that the WWTP, which was operating on an expired permit, and despite frequent, numerous, and serious violations of standards and failures to maintain equipment in proper working condition, DEP assessed the facility “less than or equal to \$10,000.”

Fortunately in this case, the citizens that live on Sanibel Island were not willing to accept the consequences of lax enforcement of the law and failing infrastructure so when the City leaders proposed that the City would buy out Sanibel Bayou Utilities, the citizens not only agreed, but they voted for a referendum to tax themselves to help offset the cost of decommissioning the failing package plant. The City's upgrading of the island's sewage treatment plant and removal of septic tanks is 90% complete. The remaining 10% of the residents that are still on septic tanks will soon be connected to the central sewer system as well. The City was conscious of finding a way to make these infrastructure investments affordable so a funding formula was designed to include the increased millage rate from the referendum, user fees and assessments.

Plant operators' failure to repair ongoing violations is not an exception; it's typical. According to a special report of the Fort Myers News-Press, the DEP has issued warnings and fines for at least one-fourth of the wastewater plants in Lee County, with little effect. The message weak enforcement sends to the operators is that it's ok to give a low priority to following wastewater treatment rules, or making expensive repairs to malfunctioning equipment, since there is no real deterrent to not being in compliance.

DEP enforcement in Florida, while continuing to decline overall, may be showing limited improvement for wastewater violations, according to the watchdog group Public Employees for Environmental Responsibility. In a report issued by the group this month, there were 215 wastewater enforcement cases in 2007, an increase from 2006. However, the average penalty assessment in domestic wastewater cases dropped 62% from 2006. Thus, while some program areas saw increases in civil penalty assessments, the same cannot be said for domestic wastewater. In addition, the PEER report issued in June 2008 found that in 2007, "county and municipal governments account for 50% of all cases in which civil penalty assessments met or exceeded \$90,000, up from 44% in 2006. The majority of those cases were domestic waste cases, signaling significant problems with Florida's infrastructure."

PEER's press release also noted, "Taxpayer-funded entities are simply not complying with Florida's environmental laws. These enforcement numbers are not merely bean counting. By virtually every measure, Florida's water, air and soil quality are deteriorating and the enforcement of anti-pollution laws is the way we defend our environment and the legacy we leave to our children."

Conclusions and recommendations

The state of Florida has grown significantly in the last few years, especially along Florida's gulf coast. Along with increased population comes the need for more infrastructure, especially for the expansion and upgrading of sewage treatment facilities. Sewage treatment plants are at or near capacity, or in some cases, actually exceeding capacity. Treatment capacity and quality is not keeping pace with population growth. Enforcement of existing wastewater treatment rules is neither consistent nor effective. The result is an increasing amount of pollutants and excess nutrients entering our water bodies, groundwater and coastal beaches, contaminating drinking and bathing water as well as causing harmful algae blooms, fish kills and seagrass die-offs.

One of the reasons we are issuing this report is to make more citizens aware of the problems in their own cities and counties caused by inadequate and malfunctioning sewage wastewater treatment. The other is to enlist concerned citizens, including business and industry leaders, to lobby state and local officials to address these problems.

Our Recommendations

Enforce existing state and federal regulations for sewage treatment facilities.

This may seem obvious, but it is the most serious problem to address, because it “enables” many of the other problems. Many facilities are old, and need major repairs to leaky pipes and other equipment. When there is little or no deterrent to being out of compliance, then that expense will be postponed or never done at all. Monetary penalties must be high enough to act as a deterrent, especially if consent orders are violated, and warning letters ignored.

Improve basic treatment rules. Require all sewage treatment facilities to be at least

Advanced Waste Treatment. This is very important because secondary treatment plants are still being approved, and secondary-treated wastewater is being allowed to be injected into the ground and applied on the land, even though many studies have shown that a number of viruses, protozoans, and other pathogens, as well as excess nutrients and chemical toxins can survive secondary treatment. Local governments can also create their own rules to address at least some of the problems associated with inadequate wastewater treatment.

Strengthen Florida Statutes – In the 2008 Legislature Senate Bill (SB) 1634 was proposed for better wastewater management. This bill would have amended Section 514.023, F.S. It provided for when a health advisory is issued that prohibits swimming in beach waters on the basis of bacteriological sampling, then the wastewater compliance evaluation section of DEP would be required to identify the source/sources of the contamination. It also required that within five days after discovering that a wastewater facility had a sewage spill, that the DEP would notify each county and municipality within a five-mile radius. DEP opposed the bill. This legislation did not pass this year, but something similar to it should be passed next year in order to better protect swimming areas from sewage contamination. The bill should be strengthened to require that when there is an ongoing problem with contaminated swimming waters and beach closures, that DEP would identify the source of the fecal contamination to determine if it originated from a human or animal source. This type of source tracking is now possible through the use of quantitative PCR (qPCR) coupled to host-specific primers and has become increasingly popular. Two of the specific approaches that are widely used by EPA and University labs include the use of the enterococcal surface protein (esp) and host-specific bacteroidetes probes.

More funding for wastewater treatment. While a number of state and federal grant programs are available at present, they need to be expanded so that cash-strapped local governments and privately owned community systems can be enlarged, upgraded and repaired. Some of the current programs require expensive local funding matches, putting them out of the reach of many

communities. There will be a high cost involved in improving Florida's wastewater infrastructure, but there is an even greater expense, in environmental, economic and human health costs, in not doing it.

Do not allow new connections to out-of-compliance facilities. We must not reward poorly functioning, polluting facilities by allowing them to add more customers, only to release more pollution. This would also create another incentive to keep a facility working properly.

Ban new surface water discharges and plan for phase out of existing surface water discharges. Discharging treated wastewater into surface waters needs to be a thing of the past. Once all treatment is up to AWT standards, it can be safely used in land applications.

Limit growth where responsible sewage disposal is not available. Like water supplies, availability of high-quality sewage treatment should become part of the concurrency test for new growth.

Safe and effective wastewater disposal is not out of our reach. But it can only be accomplished if citizens demand it, and if there is the political will among decision makers to take action. Our state and federal legislators still find many millions of dollars every year, no matter how tight the budget year, for projects of interest to their communities. Regulatory agencies can take enforcement action, or draft needed rules, and if they are given the support they need from the elected or appointed officials who guide them. What needs to happen is a new sense of urgency and priority.

If action is not taken, things will not unilaterally improve. Raw or poorly treated sewage wastewater will continue to pour out of leaky pipes, overflowing treatment ponds, and poorly designed sprayfields, in a steady and increasing flow to the Gulf of Mexico—Florida's toilet.

Glossary of sewage-related terms and abbreviations

AGP: Algal growth potential.

ASR: Aquifer storage and recovery. ASR refers to the recharge and storage of water in an aquifer system during times when water is plentiful, and recovery of the stored water during times when it is needed. When used as a form of sewage disposal, ASR may cause nutrient problems in surface, near shore, and underground water systems. For example, in the Florida Keys effluent stored underground makes its way to the near shore waters, causing degradation and mortality to the reefs as well as algae blooms.

AWT: Advanced wastewater treatment. This high level of wastewater treatment adds to secondary treatment additional filtration, high-level disinfection, nutrient removal, and removal of toxic compounds. It results in water that meets the quality standards for discharge into water bodies and poses the fewest risks to human health or ecology.

AWT standards: Discharges defined in Florida Statutes 403.086 as containing, on an average annual basis and measured in mg/L, no higher than 5 CBOD; 5 TSS; 3 TN and 1 TP, and have been subject to a high level of disinfection.

BOD: Biochemical oxygen demand. A measure of the amount of oxygen needed by microorganisms to decompose the organic matter in a water sample. The lower the level, the cleaner the water.

CBOD: Carbonaceous biochemical oxygen demand. A BOD test that measures only the carbonaceous oxygen demanding compounds. Also referred to as CBOD₅.

Classification of Florida surface waters: Class I: Potable water supply. Class II: Shellfish propagation or harvesting. Class III: Recreation, fish and wildlife. Class IV: Agricultural water supplies. Class V: Navigation, utility and industrial uses.

COD: Chemical Oxygen Demand. A measure of the amount of pollutants in a water sample, based on the amount of oxygen needed to oxidize, or break down, the chemical compounds. The higher the number, the more polluted the water.

Coliform: Fecal coliforms are bacteria that occur in human and animal sewage.

Conductivity: The standardized numerical expression of the ability of water or wastewater to carry an electric charge. Electrical conductivity estimates the amount of total dissolved salts or ions. A number of pollutants may be indicated by increased EC:

CWA. Clean Water Act. The primary federal rules created in 1972 and significantly expanded in 1977, with the goal of preventing and eliminating water pollution. For text and related information, refer to: www.epa.gov/lawsregs.

DBM: Dichlorobromomethane. Toxin, carcinogen. One of a number of toxic compounds called Trihalomethanes that are formed when water is disinfected by chlorination.

DEP: The Florida Department of Environmental Protection.

DMR: Discharge monitoring report. A report that DEP requires from NPDES permit holders. These reports are generated by the permit holder and sent to DEP on a monthly basis. Citizens can view these documents at a DEP office to see how well a facility is doing in terms of complying with their permit requirements.

DO: Dissolved oxygen. The concentration of oxygen, required by aquatic organisms, in water. Healthy water bodies usually have DO levels of 8 mg/l or higher.

EC: See Conductivity.

Effluent: Treated wastewater discharge from any treatment process or plant

FAC: The Florida Administrative Code, accessible at: www.flrules.org.

Fecal coliform: See Coliform

FS: Florida Statutes, accessible at: www.leg.state.fl.us/Statutes.

GPD: Gallons per day

MGD: Million gallons per day

Mg/l: Milligrams per liter.

Mixing zone: An area of surface waters around the point of a wastewater discharge and within which the discharge mixes with surface waters and does not meet normal water quality standards required by the CWA and state of Florida rules for one or more pollutants. Specific guidelines are given in 62-4.244 F.A.C.

NPDES: National Pollutant Discharge Elimination System. Authorized by the Clean Water Act, the NPDES permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States.

Nutrients: Chemicals used by plants for growth and metabolism, such as nitrogen and phosphorus.

Excessive amounts in water bodies have been linked to harmful algae blooms, low oxygen levels, fish kills and seagrass die-offs.

OFW: An Outstanding Florida Water is a state designation extended to waters considered worthy of special protection because of their natural attributes. This special designation is

intended to protect existing good water quality (62-302.700 F.A.C.). In general, DEP cannot issue permits for pollutant discharges to OFWs, which would lower their existing water quality.

Outfall: A location where treated wastewater is discharged to a surface water body, such as a river, stream, estuary, or ocean. 62-600.510 FAC prohibits outfalls into Class II waters.

pH: A measure of hydrogen ion activity in water, indicating acidic or alkaline (basic) properties. Using a range scale of 1 to 14, a reading of 7 would indicate acid/base neutrality, and a healthy water body. Lower numbers indicate increasing acidity, higher numbers more alkalinity.

Primary treatment: The first stage of wastewater treatment, which is limited to the settling and physical removal of solids in sewage. Generally removes only 40% of the suspended solids.

Recycled water: Also referred to as reused or reclaimed water, treated wastewater that is used for non-potable uses, such as landscape and golf course irrigation, instead of being discharged into water bodies.

RIB: Rapid infiltration basin. A rapid-rate land application system for wastewater disposal and groundwater recharge. A basin or system of basins at or below surface grade typically constructed so as to rapidly infiltrate into the ground surface water runoff or recycled water. RIBs for reuse of reclaimed water typically use a system of basins or percolation ponds, which may include subsurface drains. Florida rules require water for this form of reuse to have had secondary treatment, basic disinfection, and nitrate level not exceeding 12 mg/l (62-610.500 F.A.C.).

Secondary treatment: Secondary treatment typically utilizes separation of solids and liquids, followed by biological processes to further break down organic material and remove suspended solids. The resulting effluent is then disinfected by adding chlorine or another antimicrobial chemical before discharge. Secondary is the minimum level of municipal treatment required by the Clean Water Act. "Secondary treatment" also means wastewater treatment to a level that will achieve the effluent limitations specified in subsection 62-600.420(1), F.A.C. Some pathogens, toxins and nutrients may survive secondary treatment.

Secondary treatment standards: Required per 62-600.420(1) FAC, minimum standards for effluent are no greater, measured in milligrams per liter, than 20 CBOD and 20 TSS, or 90% removal of each of these pollutants from the wastewater influent, whichever is more stringent. Disinfection and pH control are also required. Facilities may be required to provide for additional treatment to satisfy water quality standards for receiving surface waters. However, if an ocean outfall is being utilized, the standards are lower: 30 CBOD and 30 TSS, or 85% removal of these pollutants from the wastewater, whichever is more stringent.

Septic tanks: On-site domestic sewage devices, typically used when municipal sewage service is not available. Provide very little treatment, which is usually limited to separation of solids and decomposition by bacteria. Effluent is discharged into a drainfield and absorbed by the soil.

Sewage: Wastewater that typically contains fecal or urine material. However, it may also contain a wide range of substances, such as detergents, oils, pharmaceuticals and toiletries.

Sewage treatment: The process of removing or destroying contaminants in wastewater.

Spray irrigation: A form of land application, spray irrigation is a method of treated wastewater disposal utilizing land discharge, for absorption by soil and vegetation.

SSO: Sanitary sewer overflow.

STP: Sewage Treatment Plant.

TBEL: Technology Based Effluent Limitations. Minimum treatment standards.

TDS: Total dissolved solids. The amount of dissolved substances, such as salts or minerals, in water remaining after evaporating the water and weighing the residue.

Tertiary treatment: Includes wastewater treatments additional to secondary. May include filtration and other processes to remove nitrogen, phosphorus, organic matter and toxic chemicals.

TKN: Total Kjeldahl nitrogen. The sum of free ammonia and organic nitrogen compounds in water or wastewater.

TMDL: Total maximum daily loads. Clean Water Act pollution limit standards for discharges into impaired water bodies.

TN: Total nitrogen

TOC: Total organic carbon. The carbon content in water or wastewater that is present in the form of organic material.

TP: Total phosphorus

TRC: Total residual chlorine--the chlorine remaining in water or wastewater at the end of a specific contact period as combined and free chlorine.

TSS: Total suspended solids. A measure of the amount of suspended solids found in wastewater discharge. Generally, the higher the number, the more polluted the water.

Turbidity: The cloudy appearance of water caused by the suspended particulate matter or algae.

UIC: Underground injection control. Underground injection means effluent disposal or reuse by well injection into underground geologic formations.

Wastewater: Liquid discharge from any human activity, including domestic, industrial, and agricultural, and may contain a wide range of contaminants

WWTP, WWTF: Wastewater treatment plants and facilities.

Wastewater facility: Any facility which treats and discharges wastes into waters of the state or which can reasonably be expected to be a source of water pollution. Type I facility: a wastewater facility having a permitted capacity of 500,000 gallons per day or greater. Type II: capacity of 100,000 to 499,999 gpd. Type III: capacity of 2,000 to 99,999 gpd.

Water quality standards: Standards adopted by the Florida Environmental Regulation Commission pursuant to Chapter 403, and Florida Statutes and codes. Criteria for surface waters are listed in 62-302.530 F.A.C.

WQBEL: Water quality based effluent limitations. Additional treatments over the minimum technology standards.

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