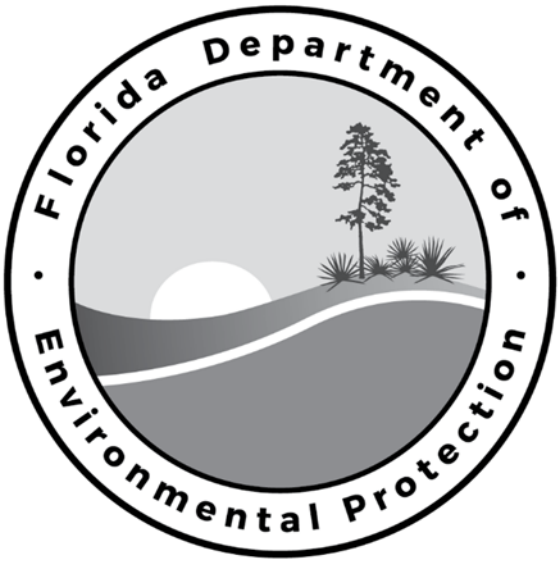



Effluent Quality Assessment of

# City of St. Augustine RO Water Treatment Plant

St. Johns County

NPDES # FL0757314

Sampled October 17, 2016

February 2017

**Biology Program**

**DEP Laboratory**

**Division of Environmental Assessment and Restoration**

DEP Laboratory Quality Manual

NELAC Certification No. E31780

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City of St. Augustine RO Water Treatment Plant (WTF), 254 West King Street, St. Augustine, St. Johns County, Florida, 32084. NPDES #FL0757314.

**Facility Overview**

City of St. Augustine RO Water Treatment Plant (WTF) is a water treatment plant which uses reverse osmosis to produce potable water. See Appendix A for a description of the facility, summary of permit limits, Administrative Order (AO) and Discharge Monitoring Report (DMR) information.

**Methods**

Effluent grab samples for toxicity testing and biological and chemical analyses were collected on October 17, 2016. All samples were collected from the EFF-1 NPDES sampling point for Outfall D-001 by Brian Davis and Patrick O'Connor (DEP Northeast Regional Operation Center) following DEP-SOP-001/01 FS 2400 Wastewater Sampling (see Appendix B).
The 96-hour acute definitive toxicity tests and algal growth potential test were performed following internal DEP SOPs TA07_03, TA07_04, and TA08_01 through TA08_09 (see Appendix B).

All field and laboratory methods followed DEP Standard Operating Procedures (see http://www.dep.state.fl.us/labs/library/lab_sops.htm and http://www.dep.state.fl.us/water/sas/sop/sops.htm for details) and met DEP quality assurance/quality control standards (see http://www.dep.state.fl.us/water/sas/qa/index.htm). Explanations of specific methods and measurements can be found in Appendix C.

**Results**

Chemistry Results (See Table 1, Table 2, Table 3 and Appendix C)

- Receiving waters for this facility fall within the North Matanzas Estuary Nutrient Watershed Segment for Numeric Nutrient Criteria (NNC). This FYI event can only provide results from a single sample: therefore, compliance should be determined with additional sampling events.
  http://ca.dep.state.fl.us/mapdirect/?focus=nutrientcriteria
- The total ammonia concentration in the composite sample collected and preserved for chemical analysis was 0.79 mg N/L. Based on the pH, salinity, and temperature of the effluent as collected, the calculated unionized ammonia concentration was <0.02 mg/L.
- Arsenic, combined radium 226 + 228, fluoride, nickel, total chromium and turbidity were detected in the effluent at levels that comply with Class III Marine Water Quality Criteria (62-302.530, F.A.C.) and/or permitted limits. Aluminum, carbonaceous biochemical oxygen demand (CBOD), iron, and total suspended solids were detected between the laboratory method detection limits (MDL) and practical quantitation limits (PQL). The effluent's dissolved oxygen was less than the permitted limit but complied with the Class III Marine Water Quality Criterion.

Algal Growth Potential (AGP)(See Table 4 and Appendix C)

- An aliquot of the AGP sample was salinity adjusted from an apparent salinity of approximately 2.05 parts per thousand (ppth) to a salinity of approximately 7.1 ppth by the addition of artificial sea salts to meet the salinity requirements of the test species.
- The salinity adjusted effluent algal growth potential (AGP) was 5.15 A mg dry wt/L of the saltwater species *Dunaliella tertiolecta.* The ratio of total nitrogen to total phosphorus suggests that the effluent is phosphorus limited (Maloney et al. 1974).

Toxicity Test Results (See Appendix C)

- Tests were performed October 18 through 22, 2016.

  *Americamysis bahia* 96-hour acute definitive bioassay – Lethal Concentration 50% mortality ($LC_{50}$) is 57.2%, 100%* mortality in 100% sample at 96 hours
  *Menidia beryllina* 96-hour acute definitive bioassay – Lethal Concentration 50% mortality ($LC_{50}$) is >100%, 10%* mortality in 100% sample at 96 hours

*NOTE: In a 96-hour acute definitive test of 100% effluent, mortality of <20% provides confidence that the effluent meets the acute toxicity criterion of Florida's Surface Water Quality Standards (Rule 62-302.500 (1) (a) 4, F.A.C.). Mortality between 20-50% indicates low to moderate levels of toxicity, and further action may be required. Mortality of >50% indicates that the effluent fails to meet the minimum requirement to discharge to waters of the state (Rule 62-4.244(3) (a), F.A.C.).

- The bioassay samples were acutely toxic to the *Americamysis bahia* test organisms but did not show acute toxicity to the *Menidia beryllina* test organisms.
- The chemistry results confirmed that the ion makeup of the sample was not in seawater proportions and that the apparent 2.2 parts per thousand (ppth) salinity of the sample was due to elevated levels of ground-water ions. The observed mortality in the *A. bahia* test is likely due to the seawater-ion imbalance of the sample. Previous research conducted by the DEP Biology Program demonstrated that *A. bahia* is much more sensitive to seawater-ion imbalances than is *M. beryllina* (Wolfe, *et al*. 1995. *Protocols for determining Major-Seawater-Ion Toxicity in Membrane-Technology Water-Treatment Concentrate*. Florida Department of Environmental Protection, Bureau of Laboratories. 96pp.) The calcium concentration was measured at 497 mg/L at 2.2 ppth salinity (salinity based on conductivity and temperature). This is approximately eighteen times (18X) the normal concentration for calcium in seawater of this salinity. The magnesium concentration was measured at 294 mg/L at 2.2 ppth salinity. This is approximately three and a half times (3.48X) the normal concentration for magnesium in seawater of this salinity. The elevated calcium and magnesium concentrations are two sources of toxicity in this sample, but other unidentified sources of toxicity cannot be ruled out without performing the major-seawater-ion imbalance toxicity testing protocols cited above.
- An aliquot of the bioassay sample was salinity-adjusted from an apparent salinity of approximately 2.2 ppth to a salinity of approximately 7.3 ppth for the *Americamysis bahia* test. The effluent salinity was not adjusted for the *Menidia beryllina test*. Forty Fathoms® marine mix artificial sea salts were used for the salinity adjustments. The salinity adjustments were performed in accordance with permit conditions. The salt control used for the salinity adjusted test was prepared by diluting 20 ppth salinity artificial seawater (ASW) with well water to a salinity of approximately 2.3 ppth then salting this solution with artificial sea salts to match the salinity of the appropriate test solution. The purpose of the salt controls was to confirm that there was no effect of adding artificial sea salts to the sample. There was no mortality in the salt controls of the *Americamysis bahia* test.

## Conclusion

The effluent sample collected from the EFF-1 NPDES sampling point for this facility on October 17, 2016, was acutely toxic to the *Americamysis bahia* test organisms but did not show toxicity to *the Menidia beryllina* test organisms during the 96-hour acute definitive bioassays. Elevated calcium and magnesium concentrations are two potential sources of toxicity in this sample, but other unidentified sources of toxicity cannot be ruled out without performing the major-seawater-ion imbalance toxicity testing protocols. The analytical chemistry results suggested that the effluent was phosphorus limited. The effluent's dissolved oxygen (mg/L) exceeded the facility's permitted limit but complied with the Class III Marine Water Quality Criterion. Additional effluent water quality samples collected on October 17, 2016, did not exceed any applicable water quality criteria or any permit conditions.

For additional information concerning this sampling event, including bioassay bench sheets and SRT data, please contact Diane.Power@dep.state.fl.us and/or Joseph.Faircloth@dep.state.fl.us.

## Literature Cited

Maloney, T. E., W. E. Miller, and D. T. Specht. 1974. The Marine Algal Assay Procedure: Bottle Test. National Environmental Research Center Office of Research and Development. U. S. EPA, Corvallis, Oregon. 43 p.

USEPA. 2002. Methods for measuring the acute toxicity of effluents to freshwater and marine organisms. 5th edition. EPA-821-R-02-012.

Wolfe, *et al*. 1995. Protocols for determining Major-Seawater-Ion Toxicity in Membrane-Technology Water-Treatment Concentrate. Florida Department of Environmental Protection, Bureau of Laboratories. 96pp.

**Table 1. Effluent limits, Class III Marine Criteria and field parameters**

| City of St. Augustine WTP | Units | Class III Criteria | Effluent Permit Limits | St. Augustine WTF |
|---|---|---|---|---|
| Temperature | C | - | Report | 24.6 |
| pH | SU | 6.5 - 8.5 | 6.5 - 8.5 | 7.2 |
| Specific Conductance | µmhos/cm | - | Report | 4220 |
| Salinity | ppth | - | - | 2.24 |
| Dissolved Oxygen | % saturation | ≥ 42 | - | 51.1 |
| Dissolved Oxygen | mg/L | - | ≥ 5.0 | 4.2[1] |
| Flow | MGD | - | ≤ 1.0 | none* |
| Total Residual Chlorine | mg/L | ≤ 0.01 | - | < 0.03[1] |

1 - Value exceeds the Class III Water Quality Criteria or permit limits

* no discharge to San Sebastian River until pipeline construction completed.

1 - measurement taken in the FDEP laboratory

**Table 2. Effluent limits, Class III Marine Criteria and analytical water chemistry data**

| City of St. Augustine WTP | Units | Class III Criteria | Effluent Permit Limits | St. Augustine WTF |
|---|---|---|---|---|
| Ortho-phosphate | mg P/L | - | - | 0.033 |
| Total Phosphorus | mg P/L | - | Report | 0.028 |
| Total Ammonia | mg N/L | - | Report | 0.79 |
| Un-ionized Ammonia | mg/L | - | Report | < 0.02 c |
| Nitrate and Nitrite | mg N/L | - | Report | 0.004 U |
| Total Kjeldahl Nitrogen | mg N/L | - | - | 0.96 J |
| Organic Nitrogen | mg N/L | - | Report | 0.17 c |
| Total Nitrogen | mg N/L | - | Report | 0.96 c |
| Total Organic Carbon | mg C/L | - | - | 7.4 |
| Chlorophyll *a* - Corrected | µg/L | - | - | 0.55 U |
| Phaeophytin | µg/L | - | - | 0.40 U |
| CBOD, 5 day, N - inhibited | mg/L | - | - | 1.7 IJ |
| Hardness | mg $CaCO_3$/L | - | - | 2450 c |
| Total Suspended Solids | mg/L | - | - | 3 I |
| Total Dissolved Solids | mg/L | - | Report | 3800 |
| Turbidity | NTU | < 29 t | - | 6.2 |
| Color (true) | PCU | - | - | 6.8 |
| Chloride | mg Cl/L | - | Report | 330 A |
| Fluoride | mg F/L | ≤ 5.0 | ≤ 5.0 s | 4.2 |
| Sulfate | mg SO4/L | - | - | 2100 A |
| Alpha, Total | pCi/L | ≤ 15.0 | ≤ 15.0 s | 25.4 U |
| Alpha-Counting Error | pCi/L | - | - | 15.2 |
| Radium 226 | pCi/L | - | - | 2.85 |
| Radium 226-Counting Error | pCi/L | - | - | 0.375 |
| Radium 228 | pCi/L | - | - | 1.25 V |
| Radium 228-Counting Error | pCi/L | - | - | 0.328 |
| Radium 226 + 228 | pCi/L | ≤ 5.0 | ≤ 5.0 s | 4.1 c |
| **Toxicity (acute definitive 96-hour %LC50)** | | | | |
| Bioassay - mysid shrimp *(Americamysis bahia)* | % effluent | ≥ 100 | ≥ 100 s | 57.2[1] |
| Bioassay - Fish (*Menidia beryllina)* | % effluent | ≥ 100 | ≥ 100 s | > 100 |

1 - Value exceeds the Class III Water Quality Criteria or permit limits

A dash (-) indicates sample/measurement was not collected or criterion/limit does not exist.

c - Value is calculated

s - Single sample

t - Shall not exceed 29 NTUs above background

A - Value reported is the mean of two or more determinations

I - The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit

J - Estimated value

U - Material analyzed for but not detected; value reported is the method detection limit

V - Analyte was detected in both sample and method blank

**Table 3. Effluent limits, Class III Marine Criteria and analytical metals data**

| City of St. Augustine WTP | Units | Class III Criteria | Effluent Permit Limits | St. Augustine WTF |
|---|---|---|---|---|
| Aluminum | µg/L | ≤ 1500 | ≤ 1500 s | 3.0 I |
| Arsenic | µg/L | ≤ 50 | ≤ 50 s | 0.33 |
| Cadmium | µg/L | ≤ 8.8 | - | 0.020 U |
| Calcium | mg/L | - | - | 497 |
| Chromium, Total [2] | µg/L | ≤ 50 | - | 0.21 |
| Copper | µg/L | ≤ 3.7 | ≤ 3.7 s | 0.10 U |
| Iron | µg/L | ≤ 300 | ≤ 300 s | 56 I |
| Lead | µg/L | ≤ 8.5 | - | 0.050 U |
| Magnesium | mg/L | - | - | 294 |
| Nickel | µg/L | ≤ 8.3 | - | 0.59 |
| Potassium | mg/L | - | - | 19.6 |
| Selenium | µg/L | ≤ 71 | - | 0.20 U |
| Silver | µg/L | ≤ 2.3 | - | 0.0050 U |
| Sodium | mg/L | - | - | 202 |
| Zinc | µg/L | ≤ 86 | - | 5.0 U |

A dash (-) indicates sample/measurement was not collected or criterion/limit does not exist.
2 - Class III Marine Water Quality Criterion (62-302.530(19)(b), F.A.C.) is for chromium-VI
s - Single sample
I - The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit
U - Material analyzed for but not detected; value reported is the method detection limit

**Table 4. Measured algal growth potential (AGP; mg dry weight/L) and ratios of nitrogen to phosphorus**

| City of St. Augustine WTP | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Location** | **Test Species** | **AGP (measured)** | **Predicted AGP (TSIN) ± 20%** | **Predicted AGP (OP) ± 20%** | **Predicted AGP (TN) ± 20%** | **Predicted AGP (TP) ± 20%** | **Inorganic N:P ratio** | **Total N:P ratio** |
| St. Augustine WTF | *Dunaliella tertiolecta* | 5.15 A * | not applicable [32] | not applicable [3] | not applicable [3] | not applicable [3] | 23.9 | 34.3 |

* - sample salinity adjusted to 7.1 ppth

3 - predictions not applicable to marine matrix

A - Value reported is the mean of two or more determinations

**Appendix A**

**Facility Summary**

State of Florida

# Department of Environmental Protection

Facility Introduction & Summary

| PART I: Information gathered prior to sampling event | |
|---|---|
| Prepared By:<br>Brittany Dion | Contact Number:<br>904-256-1678 |
| Facility Name (as it appears on permit):<br>City of St. Augustine RO Water Treatment Plant | Former Names:<br>N/A |
| NPDES Permit Number:<br>FL0757314 | Permit Expiration Date:<br>May 13th, 2017 |
| Physical Address:<br>254 West King Street, St. Augustine, FL, 32084 | |
| District:<br>Northeast | County:<br>St. Johns |
| Function of Facility:<br>Reverse osmosis public potable water facility | |
| Facility Type:<br>Industrial | Permitted Capacity (MGD):<br>1.0 MGD |
| Mean Flow for previous 12 months for all EXTERNAL outfalls listed in permit (list date range including months):<br>No discharge required. | |
| If applicable, Mean Flow for previous 12 months for REUSE outfall(s) (list date range including months):<br>N/A | |
| Description of type of Discharge:<br>☐ Continuous ☐ Intermittent ☐ Seasonal ☐ Rainfall Dependent<br>☒ Other, please specify:<br>No discharge until pipeline to San Sebastien has completed construction. | |
| Description of Sampling Location(s) - actual permit designation of permitted sampling point(s):<br>EFF-1 – After treatment but prior to final discharge into receiving waters<br>CAL-1 – Calculated value | |
| Description of Permitted Outfall(s):<br>discharge reverse osmosis reject water from Outfall D-001 to San Sebastian River. Such discharge shall be limited and monitored by the permittee as specified below and reported in accordance with Permit Condition I.B.3.: | |
| Description of Treatment Process (if multiple discharge points, include a detailed map or diagram of facility):<br>Concentrate discharge from reverse osmosis collected in on-site tank, which is then aerated as needed. Concentrate then pumped through 2500 feet of 8-inch pipe to multiport diffuser into San Sebastian River. When needed as backup, they may discharge a portion of concentrate water into gravity sewer system entering City Wastewater plant. | |

| PART I: Continued | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| List current Effluent Limits of Outfall(s) to be Sampled: This should include any AO or CO limits the facility may be under (Leave cell blank if not applicable) | | | | | | | | | | |
| | | | Effluent Limitations | | | | Monitoring Requirements | | | |
| Parameter | Units | Max/ Min | Annual Average | Monthly Average | Weekly Average | Single Sample | Monitoring Frequency | Sample Type | Monitoring Location Site Number | Notes |
| Flow | MGD | Max<br>Max | | Report | | 1.0 | Continuous | Recording Flow Meter with Totalizer | EFF-1 | |
| Oxygen, Dissolved (DO) | mg/L | Min | | | | 5.0 | Monthly | Grab | EFF-1 | |
| pH | s.u. | Min<br>Max | | 6.5<br>8.5 | | | Monthly | Grab | EFF-1 | |
| Solids, Total Dissolved (TDS) | mg/L | Max | Report | | | Report | Monthly | Grab | EFF-1 | |
| Specific Conductance | umhos/ cm | Max | | | | Report | Monthly | Meter | EFF-1 | |
| Specific Conductance | umhos/ cm | Max | | | | Report | Monthly | Meter | EFF-1 | |
| Temperature, Water | $^{o}$C | Max | | | | Report | Monthly | Meter | EFF-1 | |
| Fluoride, Total (as F) | mg/L | Max | | | | 5.0 | Monthly | Grab | EFF-1 | |
| Chloride, Total (as Cl) | mg/L | Max | | | | Report | Monthly | Grab | EFF-1 | |
| Copper, Total Recoverable | µg/L | Max | | | | 3.7 | Monthly | Grab | EFF-1 | |
| Beryllium, Total Recoverable | µg/L | Max<br>Max | .13 | | | Report | Monthly | Grab | EFF-1 | |
| Iron, Total Recoverable | mg/L | Max | | | | .3 | Quarterly | Grab | EFF-1 | |
| Aluminum, Total Recoverable | mg/L | Max | | | | 1.5 | Quarterly | Grab | EFF-1 | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Arsenic, Total Recoverable | µg/L | Max | | | | 50.0 | Quarterly | Grab | EFF-1 | |
| Radium 226 + Radium 228, Total | pCi/L | Max | | | | 5.0 | Daily Maximum | Quarterly | Grab | |
| Alpha, Gross Particle Activity | pCi/L | Max | | | | 15.0 | Quarterly | Grab | EFF-1 | |
| Nitrogen, Nitrate, Total (as N) | mg/L | Max | | | | Report | Quarterly | Grab | EFF-1 | |
| Nitrogen, Nitrite, Total (as N) | mg/L | Max | | | | Report | Quarterly | Grab | EFF-1 | |
| Nitrogen, Ammonia, Total | mg/L | Max | | | | Report | Quarterly | Grab | EFF-1 | |
| Unionized ammonia (as N) | mg/L | Max | | | | Report | Quarterly | Calculated | CAL-1 | |
| Nitrogen, Total | mg/L | Max | | | | Report | Quarterly | Grab | EFF-1 | |
| Nitrogen, Organic, Total (as N) | mg/L | Max | | | | Report | Quarterly | Grab | EFF-1 | |
| Phosphorus, Total (as P) | mg/L | Max | | | | Report | Quarterly | Grab | EFF-1 | |
| Acute Whole Effluent Toxicity, 96-hour LC50 (*Americamysis bahia & Menidia beryllina*) | percent | Min | | | | 100 | Quarterly | Grab | EFF-1 | |

| PART I: Continued | |
|---|---|
| Receiving Waters:<br>San Sebastian | Classification (indicate whether fresh or marine):<br>Class III Marine |

Toxicity Test Requirements (routine and/or additional test language, test species, salinity adjustment, etc.):

a. Effluent Limitation

(1) In any routine or additional follow-up test for acute whole effluent toxicity, the 96-hour LC50 shall not be less than 100% effluent. *[Rules 62-302.200(1), 62-302.500(1)(a)4, & 62-4.241(1)(a), F.A.C.]*

b. Monitoring Frequency

(1) Routine toxicity tests shall be conducted quarterly, the first starting within 90 days of the completion of construction and placing into service of the new Outfall D – 001.

(2) Upon completion of four consecutive, valid routine tests that demonstrate compliance with the effluent limitation in 4.a.(1) above, the permittee may submit a written request to the Department for a reduction in monitoring frequency. The request shall include a summary of the data from each test used to demonstrate compliance. The Department shall act on the request within 45 days of receipt. Reductions in monitoring shall only become effective upon the Department's written confirmation.

c. Sampling Requirements

(1) All tests shall be conducted on a single grab sample of concentrate.

**d. Test Requirements**

(1) Routine Tests: All routine tests shall be conducted using a control (0% effluent) and a minimum of five dilutions: 100%, 75%, 50%, 25%, and 12.5% effluent.

(2) The permittee shall conduct 96-hour acute static renewal toxicity tests using the mysid, *Americamysis bahia*, and the inland silverside, *Menidia beryllina*, concurrently.

(3) All test species, procedures and quality assurance criteria used shall be in accordance with Methods for Measuring Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, 5th Edition, EPA-821-R-02-012. Any deviation of the bioassay procedures outlined herein shall be submitted in writing to the Department for review and approval prior to use. In the event the above method is revised, the permittee shall conduct acute toxicity testing in accordance with the revised method.

(4) The control water and dilution water used shall be artificial seawater and diluted to the test salinity as described in EPA-821-R-02-012, Section 7.2.4. The test salinity shall be determined as follows:

(a) When the salinity of the effluent is between 1 and 7 parts per thousand (ppt), the following salinity adjustment shall be used. For the *Americamysis bahia* bioassays, the effluent and the control (0% effluent) shall be adjusted to a salinity of 7 ppt for the 100% effluent test using artificial sea salts. No salinity adjustment shall be done for the *Menidia beryllina* bioassay test. The salinity of the control/dilution water (0% effluent) shall match the test salinity of the effluent. A salinity adjustment control should be prepared and included with the *Americamysis bahia* bioassay.

(b) The salinity adjustment control is intended to identify toxicity resulting from adjusting the salinity of the effluent with artificial sea salts. To prepare the salinity adjustment control, dilute the control/dilution water to the salinity of the effluent and adjust the salinity of the salinity adjustment control to 7 ppt at the same time that the salinity of the effluent is adjusted to 7 ppt, using the same artificial sea salts.

(c) When the salinity of the effluent is greater than 7 ppt, no salinity adjustment shall be made to the effluent and the test shall be run at the effluent salinity. The salinity of the control/dilution water shall match the test salinity of the effluent.

e. Quality Assurance Requirements

(1) A standard reference toxicant (SRT) quality assurance (QA) acute toxicity test shall be conducted with each species used in the required toxicity tests either concurrently or initiated no more than 30 days before the date of each routine or additional follow-up test conducted. Additionally, the SRT test must be conducted concurrently if the test organisms are obtained from outside the test laboratory unless the test organism supplier provides control chart data from at least the last five monthly acute toxicity tests using the same reference toxicant and test conditions. If the organism supplier provides the required SRT data, the organism supplier's SRT data and the test laboratory's monthly SRT-QA data shall be included in the reports for each companion routine or additional follow-up test required.

(2) If the mortality in the control (0% effluent) exceeds 10% for either species in any test, the test for that species (including the control) shall be invalidated and the test repeated. The repeat test shall begin within 14 days after the last day of the invalid test.

(3) If 100% mortality occurs in all effluent concentrations for either species prior to the end of any test and the control mortality is less than 10% at that time, the test (including the control) for that species shall be terminated with the conclusion that the test fails and constitutes non-compliance.

(4) Routine and additional follow-up tests shall be evaluated for acceptability based on the concentration-response relationship, as required by EPA-821-R-02-012, Section 12.2.6.2., and included with the bioassay laboratory reports.

Administrative or Consent Orders (date executed, specific requirements, interim limit dates-if applicable, etc.):

N/A

Facility Mixing Zone Details (if applicable):

N/A

List Permit Violations (DMR data) and plant upsets that occurred at the plant within the last year:

| Date | Parameter and Units | Limit | Result |
|---|---|---|---|
| | | | |
| | | | |
| | | | |

Describe previous FYI and WQBEL study:

N/A

Describe previous or current Enforcement Actions (including WLs):

None

Describe any violations or problems noted in previous inspection:

No previous inspection.

Discuss whether DMR trends within previous five years are improving or declining:

DMR’s not required- none have been submitted.

Additional Comments (this should include a trend of the Effluent, i.e. if the facility is now Reuse):

| PART II: Sampling Event Information | |
|---|---|
| Date(s) sample collected: | Sampler(s): |
| Temperature (Deg C): | pH (SU): |
| Dissolved Oxygen (mg/L): | Conductivity (µmhos/cm): |
| Total Residual Chlorine (mg/L): | Total Residual Chlorine - after Disinfection (mg/L): |
| Method of Chlorination: | Method of De-chlorination: |
| Flow During Sample Collection for each outfall(MGD): | |
| Mean Flow for each outfall for previous 12 months based on sampling date (If samples are taken on more than one day, indicate Mean Flow for each day): | |
| Describe Discharge during Sampling Event:<br>☐ Continuous ☐ Intermittent ☐ Seasonal ☐ Rainfall Dependent<br>☐ Other, please specify: | |
| Describe any conditions, difficulties or abnormal events that occurred during the sample collection and any other additional comments here: | |

## Appendix B

## Explanation of Measurements

**(1) Quality Assurance and Quality Control**

FDEP's quality assurance requirements for analytical laboratories and field activities are codified in Chapter 62-160, F.A.C., Quality Assurance (QA Rule) and in internal Standard Operating Procedures (FDEP SOPs). Methods for all analyses are on file at the FDEP Central Laboratory in Tallahassee and may be viewed on the web at http://www.dep.state.fl.us/labs/library/lab_sops.htm and/or http://www.dep.state.fl.us/water/sas/sop/sops.htm.

**(2) Chemical Analyses of the Effluent**

The effluent was analyzed for nutrients, metals, organic constituents (base, neutral, and acid extractables) and pesticides following FDEP SOPs. The results from these analyses were compared with Water Quality Criteria (62-302, F.A.C.) and facility permit limits.

**(3) Toxicity Bioassays**

Greater than 50% mortality in an acute toxicity test may constitute an exceedance of 62-302.500(1)a and/or facility permit limits. A 25% inhibition concentration (IC25) is the effluent concentration causing a 25% reduction in a biological response such as biomass or reproduction when compared to a control population. An IC25 of less than 100% in a chronic test may constitute exceedances of 62-302.530(20), 62-302.530(61) and/or facility permit limits. A no observed effect concentration (NOEC) less than 100% effluent in a chronic test may constitute an exceedance of 62-302.530(61) and/or facility permit limits. Standard reference toxicant (SRT) tests are conducted monthly to ensure quality in toxicity testing.

**(4) Bacteriological Testing**

High levels of fecal coliform bacteria may constitute an exceedance of 62-302.530(6) and/or facility permit limits. Fecal coliform and enterococci results often are based on colony counts outside the acceptable range (B-qualifier). The dilutions performed on the sample did not yield results within the method acceptable range of 20- 60 colony forming units per plate. The B-qualifier does not affect data quality.

**(5) Chlorophyll *a* Content**

Chlorophyll *a* content is an estimate algal biomass. High algal biomass implies nutrient stress (Stevenson and Bahls 1999) and may constitute exceedances of 62-302.530(46), F.A.C., 62-302.530(47)(a), F.A.C., and/or 62-302.530(47)(b), F.A.C.

**(6) Algal Growth Potential (AGP)**

The algal growth potential (AGP) value is the peak growth of the alga within that 14-day period, recorded as mg dry weight/L. The AGP range of 6.10 to 20.0 mg dry wt/L is suggested to be representative of high productivity for freshwater (Miller et al. 1978). High AGP values may constitute exceedances of 62-302.530(46), F.A.C., 62-302.530(47)(a), F.A.C. and/or 62-302.530(47)(b), F.A.C..

The concentration of nutrients in a water sample may be used to calculate the expected yield of AGP in a low salinity sample under the assumption that other required nutrients (e.g. silicon, micronutrients) are present in excess (Miller *et al*. 1978). The expected amount of production is calculated as 38 times the total soluble inorganic nitrogen (nitrate and nitrite plus ammonia) under nitrogen limitation or 430 times the ortho-phosphate (OP) concentration under phosphorus limitation with an error of $\pm$ 20%. When the ratio of nitrogen to phosphorus (N:P) is less than 10:1, nitrogen limitation of algal production is likely. When the N:P ratio is 20:1 or greater, phosphorus limitation is likely (EPA-822-B-00-002). For ratios in-between, co-limitation may occur. Production of lower biomass than expected may be evidence of growth inhibition related to toxic compounds present in the water sample tested and may constitute an exceedance of 62-302.530(61) F.A.C. Expected AGP is not calculated for marine samples incubated with *Dunaliella*.

**(7) Definition of Qualifiers**

A - Value reported is the mean of two or more determinations
B - Results based on colony counts outside the acceptable range.
I - The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.
J - Estimated value
K - Actual value is known to be less than value given
L - Actual value is known to be greater than value given
N - Presumptive evidence of presence of material.
O - Sampled, but analysis lost or not performed.
Q - Sample held beyond normal holding time.
T - Value reported is less than the criterion of detection.
U - Material was analyzed for but not detected. The reported value is the method detection limit for the sample analyzed.
V - Analyte was detected in both sample and method blank.
X - Too few individuals to calculate SCI value.
Y - The laboratory analysis was from an unpreserved or improperly preserved sample. The data may not be accurate
Z - Colonies were too numerous to count (TNTC)

## Appendix C

## Chemical analysis of effluent

| Date Sampled | Field ID | Analysis Group | Component | Result | Units | MDL | PQL |
|---|---|---|---|---|---|---|---|
| 10/17/2016 | St. Augustine WTF | AGP/LN | Algal Growth Potential-Salinity Adjusted | 5.15 A | mg DryWt/L | 3 | 3 |
| 10/17/2016 | St. Augustine WTF | Chlorophyll/Grain Size/BOD | Chlorophyll/Phaeophytin Ratio | 12 | | 0 | 0 |
| 10/17/2016 | St. Augustine WTF | Chlorophyll/Grain Size/BOD | Chlorophyll-a, Uncorrected | 0.40 U | µg/L | 0.4 | 1.2 |
| 10/17/2016 | St. Augustine WTF | Chlorophyll/Grain Size/BOD | Phaeophytin-a | 0.40 U | µg/L | 0.4 | 1.2 |
| 10/17/2016 | St. Augustine WTF | Chlorophyll/Grain Size/BOD | Biochemical Oxygen Demand-5 Day,N-Inhib | 1.7 IJ | mg/L | 0.2 | 2 |
| 10/17/2016 | St. Augustine WTF | Chlorophyll/Grain Size/BOD | Chlorophyll-a, Corrected | 0.55 U | µg/L | 0.55 | 1.7 |
| 10/17/2016 | St. Augustine WTF | Toxicology | Bioassay-Acute-Def-SW-Mysid, LC50 | 57.2 | LC50 | | |
| 10/17/2016 | St. Augustine WTF | Toxicology | Bioassay-Acute-Def-SW-Fish, LC50 | 100 L | LC50 | | |
| 10/17/2016 | St. Augustine WTF | Metals | Cadmium | 0.020 U | µg/L | 0.02 | 0.08 |
| 10/17/2016 | St. Augustine WTF | Metals | Chromium | 0.21 | µg/L | 0.05 | 0.2 |
| 10/17/2016 | St. Augustine WTF | Metals | Aluminum | 3.0 I | µg/L | 2 | 8 |
| 10/17/2016 | St. Augustine WTF | Metals | Selenium | 0.20 U | µg/L | 0.2 | 0.8 |
| 10/17/2016 | St. Augustine WTF | Metals | Lead | 0.050 U | µg/L | 0.05 | 0.2 |
| 10/17/2016 | St. Augustine WTF | Metals | Copper | 0.10 U | µg/L | 0.1 | 0.4 |
| 10/17/2016 | St. Augustine WTF | Metals | Magnesium | 294 | mg/L | 0.2 | 0.8 |
| 10/17/2016 | St. Augustine WTF | Metals | Zinc | 5.0 U | µg/L | 5 | 20 |
| 10/17/2016 | St. Augustine WTF | Metals | Potassium | 19.6 | mg/L | 1.5 | 6 |
| 10/17/2016 | St. Augustine WTF | Metals | Arsenic | 0.33 | µg/L | 0.05 | 0.2 |
| 10/17/2016 | St. Augustine WTF | Metals | Iron | 56 I | µg/L | 30 | 120 |
| 10/17/2016 | St. Augustine WTF | Metals | Beryllium | 0.010 U | µg/L | 0.01 | 0.04 |
| 10/17/2016 | St. Augustine WTF | Metals | Calcium | 497 | mg/L | 0.38 | 1.5 |
| 10/17/2016 | St. Augustine WTF | Metals | Sodium | 202 | mg/L | 2.5 | 10 |
| 10/17/2016 | St. Augustine WTF | Metals | Silver | 0.0050 U | µg/L | 0.005 | 0.02 |
| 10/17/2016 | St. Augustine WTF | Metals | Nickel | 0.59 | µg/L | 0.05 | 0.2 |
| 10/17/2016 | St. Augustine WTF | Nutrients | NO2NO3-N | 0.004 U | mg N/L | 0.004 | 0.01 |
| 10/17/2016 | St. Augustine WTF | Nutrients | Total Alkalinity | 178 A | mg CaCO3/L | 0.65 | 2.5 |
| 10/17/2016 | St. Augustine WTF | Nutrients | O-Phosphate-P | 0.033 | mg P/L | 0.004 | 0.01 |
| 10/17/2016 | St. Augustine WTF | Nutrients | TSS | 3 I | mg/L | 2 | 10 |
| 10/17/2016 | St. Augustine WTF | Nutrients | Color (true) | 6.8 | PCU | 2.5 | 6 |
| 10/17/2016 | St. Augustine WTF | Nutrients | Fluoride | 4.2 | mg F/L | 0.035 | 0.1 |
| 10/17/2016 | St. Augustine WTF | Nutrients | Organic Carbon | 7.4 | mg C/L | 0.5 | 1 |
| 10/17/2016 | St. Augustine WTF | Nutrients | Total-P | 0.028 | mg P/L | 0.002 | 0.005 |
| 10/17/2016 | St. Augustine WTF | Nutrients | Sulfate | 2.1E+03 A | mg SO4/L | 40 | 100 |
| 10/17/2016 | St. Augustine WTF | Nutrients | Turbidity | 6.2 | NTU | 0.1 | 0.1 |
| 10/17/2016 | St. Augustine WTF | Nutrients | Chloride | 330 A | mg Cl/L | 4 | 10 |
| 10/17/2016 | St. Augustine WTF | Nutrients | Ammonia-N | 0.79 | mg N/L | 0.02 | 0.05 |

| Date Sampled | Field ID | Analysis Group | Component | Result | Units | MDL | PQL |
|---|---|---|---|---|---|---|---|
| 10/17/2016 | St. Augustine WTF | Nutrients | Kjeldahl Nitrogen | 0.96 J | mg N/L | 0.08 | 0.2 |
| 10/17/2016 | St. Augustine WTF | Nutrients | TDS | 3.80E+03 | mg/L | 15 | 25 |
| 10/17/2016 | St. Augustine WTF | Overflow | Radium 228-Counting Error | 0.328 | pCi/L | 0.4 | |
| 10/17/2016 | St. Augustine WTF | Overflow | Radium 226-Counting Error | 0.375 | pCi/L | 0.209 | |
| 10/17/2016 | St. Augustine WTF | Overflow | Radium 226 | 2.85 | pCi/L | 0.209 | |
| 10/17/2016 | St. Augustine WTF | Overflow | Alpha-Counting Error | 15.2 | pCi/L | 25.4 | |
| 10/17/2016 | St. Augustine WTF | Overflow | Radium 228 | 1.25 V | pCi/L | 0.4 | |
| 10/17/2016 | St. Augustine WTF | Overflow | Alpha, Total | 25.4 U | pCi/L | 25.4 | |
| 10/17/2016 | St. Augustine WTF | Pesticides | Disulfoton | 0.0047 U | µg/L | 0.0047 | 0.019 |
| 10/17/2016 | St. Augustine WTF | Pesticides | Ethion | 0.0094 U | µg/L | 0.0094 | 0.037 |
| 10/17/2016 | St. Augustine WTF | Pesticides | Ethoprop | 0.0047 U | µg/L | 0.0047 | 0.019 |
| 10/17/2016 | St. Augustine WTF | Pesticides | Mevinphos | 0.0094 U | µg/L | 0.0094 | 0.037 |
| 10/17/2016 | St. Augustine WTF | Pesticides | Chlorpyrifos Methyl | 0.0094 U | µg/L | 0.0094 | 0.037 |
| 10/17/2016 | St. Augustine WTF | Pesticides | Fenamiphos | 0.028 U | µg/L | 0.028 | 0.11 |
| 10/17/2016 | St. Augustine WTF | Pesticides | Phorate | 0.0047 U | µg/L | 0.0047 | 0.019 |
| 10/17/2016 | St. Augustine WTF | Pesticides | Azinphos Methyl | 0.019 U | µg/L | 0.019 | 0.075 |
| 10/17/2016 | St. Augustine WTF | Pesticides | Hexazinone | 0.028 UJ | µg/L | 0.028 | 0.11 |
| 10/17/2016 | St. Augustine WTF | Pesticides | Metribuzin | 0.019 U | µg/L | 0.019 | 0.075 |
| 10/17/2016 | St. Augustine WTF | Pesticides | Naled | 0.037 U | µg/L | 0.037 | 0.15 |
| 10/17/2016 | St. Augustine WTF | Pesticides | Atrazine | 0.0094 U | µg/L | 0.0094 | 0.037 |
| 10/17/2016 | St. Augustine WTF | Pesticides | Norflurazon | 0.028 U | µg/L | 0.028 | 0.11 |
| 10/17/2016 | St. Augustine WTF | Pesticides | Diazinon | 0.0094 U | µg/L | 0.0094 | 0.037 |
| 10/17/2016 | St. Augustine WTF | Pesticides | Fonofos | 0.0094 U | µg/L | 0.0094 | 0.037 |
| 10/17/2016 | St. Augustine WTF | Pesticides | Malathion | 0.0094 U | µg/L | 0.0094 | 0.037 |
| 10/17/2016 | St. Augustine WTF | Pesticides | Metalaxyl | 0.037 UJ | µg/L | 0.037 | 0.15 |
| 10/17/2016 | St. Augustine WTF | Pesticides | Parathion Methyl | 0.0094 U | µg/L | 0.0094 | 0.037 |
| 10/17/2016 | St. Augustine WTF | Pesticides | Prometryn | 0.019 U | µg/L | 0.019 | 0.075 |
| 10/17/2016 | St. Augustine WTF | Pesticides | Ametryn | 0.0094 U | µg/L | 0.0094 | 0.037 |
| 10/17/2016 | St. Augustine WTF | Pesticides | Atrazine Desethyl | 0.0094 U | µg/L | 0.0094 | 0.037 |
| 10/17/2016 | St. Augustine WTF | Pesticides | Butylate | 0.019 U | µg/L | 0.019 | 0.075 |
| 10/17/2016 | St. Augustine WTF | Pesticides | Demeton | 0.022 U | µg/L | 0.022 | 0.09 |
| 10/17/2016 | St. Augustine WTF | Pesticides | Metolachlor | 0.056 U | µg/L | 0.056 | 0.22 |
| 10/17/2016 | St. Augustine WTF | Pesticides | Prometon | 0.019 UJ | µg/L | 0.019 | 0.075 |
| 10/17/2016 | St. Augustine WTF | Pesticides | Atrazine Desisopropyl | 0.0094 U | µg/L | 0.0094 | 0.037 |
| 10/17/2016 | St. Augustine WTF | Pesticides | Alachlor | 0.056 U | µg/L | 0.056 | 0.22 |
| 10/17/2016 | St. Augustine WTF | Pesticides | Simazine | 0.0094 U | µg/L | 0.0094 | 0.037 |
| 10/17/2016 | St. Augustine WTF | Pesticides | Sucralose | 0.010 U | µg/L | 0.01 | 0.04 |
| 10/17/2016 | St. Augustine WTF | Pesticides | Bromacil | 0.037 U | µg/L | 0.037 | 0.15 |
| 10/17/2016 | St. Augustine WTF | Pesticides | Parathion Ethyl | 0.019 U | µg/L | 0.019 | 0.075 |

| Date Sampled | Field ID | Analysis Group | Component | Result | Units | MDL | PQL |
|---|---|---|---|---|---|---|---|
| 10/17/2016 | St. Augustine WTF | Pesticides | Chlorpyrifos Ethyl | 0.0094 U | µg/L | 0.0094 | 0.037 |
| 10/17/2016 | St. Augustine WTF | Priority Organic Pollutants | 2,4-Dimethylphenol | 9.3 U | µg/L | 9.3 | 37 |
| 10/17/2016 | St. Augustine WTF | Priority Organic Pollutants | Di-n-butyl phthalate | 1.9 U | µg/L | 1.9 | 7.5 |
| 10/17/2016 | St. Augustine WTF | Priority Organic Pollutants | Indeno(1,2,3-cd)pyrene | 0.19 U | µg/L | 0.19 | 0.75 |
| 10/17/2016 | St. Augustine WTF | Priority Organic Pollutants | N-Nitrosodimethylamine | 1.9 U | µg/L | 1.9 | 7.5 |
| 10/17/2016 | St. Augustine WTF | Priority Organic Pollutants | Phenanthrene | 0.19 U | µg/L | 0.19 | 0.75 |
| 10/17/2016 | St. Augustine WTF | Priority Organic Pollutants | 2-Chlorophenol | 0.93 U | µg/L | 0.93 | 3.7 |
| 10/17/2016 | St. Augustine WTF | Priority Organic Pollutants | 3,3'-Dichlorobenzidine | 37 U | µg/L | 37 | 150 |
| 10/17/2016 | St. Augustine WTF | Priority Organic Pollutants | Acenaphthylene | 0.19 U | µg/L | 0.19 | 0.75 |
| 10/17/2016 | St. Augustine WTF | Priority Organic Pollutants | Anthracene | 0.19 U | µg/L | 0.19 | 0.75 |
| 10/17/2016 | St. Augustine WTF | Priority Organic Pollutants | Benzo(a)anthracene | 0.19 U | µg/L | 0.19 | 0.75 |
| 10/17/2016 | St. Augustine WTF | Priority Organic Pollutants | Benzo(b)fluoranthene | 0.19 U | µg/L | 0.19 | 0.75 |
| 10/17/2016 | St. Augustine WTF | Priority Organic Pollutants | Fluoranthene | 0.19 U | µg/L | 0.19 | 0.75 |
| 10/17/2016 | St. Augustine WTF | Priority Organic Pollutants | Hexachlorocyclopentadiene | 2.8 U | µg/L | 2.8 | 11 |
| 10/17/2016 | St. Augustine WTF | Priority Organic Pollutants | Nitrobenzene | 1.9 U | µg/L | 1.9 | 7.5 |
| 10/17/2016 | St. Augustine WTF | Priority Organic Pollutants | 2,6-Dinitrotoluene | 0.93 U | µg/L | 0.93 | 3.7 |
| 10/17/2016 | St. Augustine WTF | Priority Organic Pollutants | Benzo(k)fluoranthene | 0.19 U | µg/L | 0.19 | 0.75 |
| 10/17/2016 | St. Augustine WTF | Priority Organic Pollutants | Dibenzo(a,h)anthracene | 0.19 U | µg/L | 0.19 | 0.75 |
| 10/17/2016 | St. Augustine WTF | Priority Organic Pollutants | Isophorone | 0.93 U | µg/L | 0.93 | 3.7 |
| 10/17/2016 | St. Augustine WTF | Priority Organic Pollutants | 2,4,6-Trichlorophenol | 0.93 U | µg/L | 0.93 | 3.7 |
| 10/17/2016 | St. Augustine WTF | Priority Organic Pollutants | 2,4-Dinitrophenol | 14 U | µg/L | 14 | 56 |
| 10/17/2016 | St. Augustine WTF | Priority Organic Pollutants | 4-Chlorophenyl phenyl ether | 1.9 U | µg/L | 1.9 | 7.5 |
| 10/17/2016 | St. Augustine WTF | Priority Organic Pollutants | 4-Nitrophenol | 14 U | µg/L | 14 | 56 |
| 10/17/2016 | St. Augustine WTF | Priority Organic Pollutants | Butyl benzyl phthalate | 0.93 U | µg/L | 0.93 | 3.7 |
| 10/17/2016 | St. Augustine WTF | Priority Organic Pollutants | Bis(2-ethylhexyl)phthalate | 1.9 U | µg/L | 1.9 | 7.5 |
| 10/17/2016 | St. Augustine WTF | Priority Organic Pollutants | Hexachlorobenzene | 0.93 U | µg/L | 0.93 | 3.7 |
| 10/17/2016 | St. Augustine WTF | Priority Organic Pollutants | Hexachlorobutadiene | 2.8 U | µg/L | 2.8 | 11 |
| 10/17/2016 | St. Augustine WTF | Priority Organic Pollutants | Hexachloroethane | 2.8 U | µg/L | 2.8 | 11 |
| 10/17/2016 | St. Augustine WTF | Priority Organic Pollutants | Naphthalene | 0.19 U | µg/L | 0.19 | 0.75 |
| 10/17/2016 | St. Augustine WTF | Priority Organic Pollutants | 2-Chloronaphthalene | 0.93 U | µg/L | 0.93 | 3.7 |
| 10/17/2016 | St. Augustine WTF | Priority Organic Pollutants | 2-Methyl-4,6-dinitrophenol | 2.8 U | µg/L | 2.8 | 11 |
| 10/17/2016 | St. Augustine WTF | Priority Organic Pollutants | Benzidine | 93 U | µg/L | 93 | 370 |
| 10/17/2016 | St. Augustine WTF | Priority Organic Pollutants | Bis(2-chloroethoxy)methane | 0.93 U | µg/L | 0.93 | 3.7 |
| 10/17/2016 | St. Augustine WTF | Priority Organic Pollutants | Bis(2-chloroethyl)ether | 0.93 U | µg/L | 0.93 | 3.7 |
| 10/17/2016 | St. Augustine WTF | Priority Organic Pollutants | Chrysene | 0.19 U | µg/L | 0.19 | 0.75 |
| 10/17/2016 | St. Augustine WTF | Priority Organic Pollutants | Dimethyl phthalate | 0.93 U | µg/L | 0.93 | 3.7 |
| 10/17/2016 | St. Augustine WTF | Priority Organic Pollutants | Pyrene | 0.19 U | µg/L | 0.19 | 0.75 |
| 10/17/2016 | St. Augustine WTF | Priority Organic Pollutants | 1,2,4-Trichlorobenzene | 0.93 U | µg/L | 0.93 | 3.7 |
| 10/17/2016 | St. Augustine WTF | Priority Organic Pollutants | 2-Nitrophenol | 0.93 U | µg/L | 0.93 | 3.7 |

| Date Sampled | Field ID | Analysis Group | Component | Result | Units | MDL | PQL |
|---|---|---|---|---|---|---|---|
| 10/17/2016 | St. Augustine WTF | Priority Organic Pollutants | 4-Bromophenyl phenyl ether | 0.93 U | µg/L | 0.93 | 3.7 |
| 10/17/2016 | St. Augustine WTF | Priority Organic Pollutants | Benzo(g,h,i)perylene | 0.19 U | µg/L | 0.19 | 0.75 |
| 10/17/2016 | St. Augustine WTF | Priority Organic Pollutants | Bis(2-chloroisopropyl)ether | 2.8 U | µg/L | 2.8 | 11 |
| 10/17/2016 | St. Augustine WTF | Priority Organic Pollutants | Di-n-octyl phthalate | 0.93 U | µg/L | 0.93 | 3.7 |
| 10/17/2016 | St. Augustine WTF | Priority Organic Pollutants | Fluorene | 0.19 U | µg/L | 0.19 | 0.75 |
| 10/17/2016 | St. Augustine WTF | Priority Organic Pollutants | N-Nitrosodiphenylamine/ Diphenylamine | 2.8 U | µg/L | 2.8 | 11 |
| 10/17/2016 | St. Augustine WTF | Priority Organic Pollutants | 2,4-Dinitrotoluene | 0.93 U | µg/L | 0.93 | 3.7 |
| 10/17/2016 | St. Augustine WTF | Priority Organic Pollutants | 4-Chloro-3-methylphenol | 0.93 U | µg/L | 0.93 | 3.7 |
| 10/17/2016 | St. Augustine WTF | Priority Organic Pollutants | Diethyl phthalate | 1.9 U | µg/L | 1.9 | 7.5 |
| 10/17/2016 | St. Augustine WTF | Priority Organic Pollutants | Pentachlorophenol | 0.93 U | µg/L | 0.93 | 3.7 |
| 10/17/2016 | St. Augustine WTF | Priority Organic Pollutants | Phenol | 0.93 U | µg/L | 0.93 | 3.7 |
| 10/17/2016 | St. Augustine WTF | Priority Organic Pollutants | 2,4-Dichlorophenol | 0.93 U | µg/L | 0.93 | 3.7 |
| 10/17/2016 | St. Augustine WTF | Priority Organic Pollutants | Acenaphthene | 0.19 U | µg/L | 0.19 | 0.75 |
| 10/17/2016 | St. Augustine WTF | Priority Organic Pollutants | Benzo(a)pyrene | 0.19 U | µg/L | 0.19 | 0.75 |
| 10/17/2016 | St. Augustine WTF | Priority Organic Pollutants | N-Nitrosodi-n-propylamine | 1.9 U | µg/L | 1.9 | 7.5 |
| 10/17/2016 | St. Augustine WTF | Nutrients | Specific Conductance | 4220 | umhos/cm | | |
| 10/17/2016 | St. Augustine WTF | Nutrients | pH | 7.2 | | | |
| 10/17/2016 | St. Augustine WTF | Nutrients | Dissolved Oxygen | 4.2 | mg/L | | |
| 10/17/2016 | St. Augustine WTF | Nutrients | Temperature | 24.6 | C | | |
| 10/17/2016 | Equipment Blank | Metals | Calcium | 0.075 U | mg/L | 0.075 | 0.3 |
| 10/17/2016 | Equipment Blank | Metals | Silver | 0.0050 U | µg/L | 0.005 | 0.02 |
| 10/17/2016 | Equipment Blank | Metals | Cadmium | 0.020 U | µg/L | 0.02 | 0.08 |
| 10/17/2016 | Equipment Blank | Metals | Zinc | 5.0 U | µg/L | 5 | 20 |
| 10/17/2016 | Equipment Blank | Metals | Nickel | 0.050 U | µg/L | 0.05 | 0.2 |
| 10/17/2016 | Equipment Blank | Metals | Potassium | 0.30 U | mg/L | 0.3 | 1.2 |
| 10/17/2016 | Equipment Blank | Metals | Beryllium | 0.010 U | µg/L | 0.01 | 0.04 |
| 10/17/2016 | Equipment Blank | Metals | Lead | 0.050 U | µg/L | 0.05 | 0.2 |
| 10/17/2016 | Equipment Blank | Metals | Selenium | 0.20 U | µg/L | 0.2 | 0.8 |
| 10/17/2016 | Equipment Blank | Metals | Chromium | 0.050 U | µg/L | 0.05 | 0.2 |
| 10/17/2016 | Equipment Blank | Metals | Iron | 30 U | µg/L | 30 | 120 |
| 10/17/2016 | Equipment Blank | Metals | Sodium | 0.50 U | mg/L | 0.5 | 2 |
| 10/17/2016 | Equipment Blank | Metals | Copper | 0.10 U | µg/L | 0.1 | 0.4 |
| 10/17/2016 | Equipment Blank | Metals | Magnesium | 0.040 U | mg/L | 0.04 | 0.16 |
| 10/17/2016 | Equipment Blank | Metals | Aluminum | 2.0 U | µg/L | 2 | 8 |
| 10/17/2016 | Equipment Blank | Metals | Arsenic | 0.050 U | µg/L | 0.05 | 0.2 |
| 10/17/2016 | Equipment Blank | Nutrients | Ammonia-N | 0.002 U | mg N/L | 0.002 | 0.005 |
| 10/17/2016 | Equipment Blank | Nutrients | NO2NO3-N | 0.004 U | mg N/L | 0.004 | 0.01 |
| 10/17/2016 | Equipment Blank | Nutrients | Kjeldahl Nitrogen | 0.080 U | mg N/L | 0.08 | 0.2 |
| 10/17/2016 | Equipment Blank | Nutrients | Color (true) | 2.5 U | PCU | 2.5 | 6 |

| Date Sampled | Field ID | Analysis Group | Component | Result | Units | MDL | PQL |
|---|---|---|---|---|---|---|---|
| 10/17/2016 | Equipment Blank | Nutrients | Total-P | 0.002 U | mg P/L | 0.002 | 0.005 |
| 10/17/2016 | Equipment Blank | Nutrients | Chloride | 0.20 U | mg Cl/L | 0.2 | 0.5 |
| 10/17/2016 | Equipment Blank | Nutrients | Turbidity | 0.10 U | NTU | 0.1 | 0.1 |
| 10/17/2016 | Equipment Blank | Nutrients | O-Phosphate-P | 0.004 U | mg P/L | 0.004 | 0.01 |
| 10/17/2016 | Equipment Blank | Nutrients | Fluoride | 0.035 U | mg F/L | 0.035 | 0.1 |
| 10/17/2016 | Equipment Blank | Nutrients | Sulfate | 0.20 U | mg SO4/L | 0.2 | 0.5 |
| 10/17/2016 | Equipment Blank | Nutrients | Organic Carbon | 0.50 U | mg C/L | 0.5 | 1 |
| 10/17/2016 | Equipment Blank | Nutrients | Total Alkalinity | 0.65 U | mg CaCO3/L | 0.65 | 2.5 |
| 10/17/2016 | Equipment Blank | Overflow | Radium 228 | 0.496 U | pCi/L | 0.496 | |
| 10/17/2016 | Equipment Blank | Overflow | Alpha-Counting Error | 0.446 | pCi/L | 0.786 | |
| 10/17/2016 | Equipment Blank | Overflow | Radium 226 | 0.255 U | pCi/L | 0.255 | |
| 10/17/2016 | Equipment Blank | Overflow | Radium 228-Counting Error | 0.270 | pCi/L | 0.496 | |
| 10/17/2016 | Equipment Blank | Overflow | Radium 226-Counting Error | 0.146 | pCi/L | 0.255 | |
| 10/17/2016 | Equipment Blank | Overflow | Alpha, Total | 0.786 U | pCi/L | 0.786 | |
| 10/17/2016 | Equipment Blank | Pesticides | Atrazine Desethyl | 0.0094 U | µg/L | 0.0094 | 0.038 |
| 10/17/2016 | Equipment Blank | Pesticides | Prometryn | 0.019 U | µg/L | 0.019 | 0.075 |
| 10/17/2016 | Equipment Blank | Pesticides | Azinphos Methyl | 0.019 U | µg/L | 0.019 | 0.075 |
| 10/17/2016 | Equipment Blank | Pesticides | Bromacil | 0.038 U | µg/L | 0.038 | 0.15 |
| 10/17/2016 | Equipment Blank | Pesticides | Demeton | 0.023 U | µg/L | 0.023 | 0.091 |
| 10/17/2016 | Equipment Blank | Pesticides | Ethion | 0.0094 U | µg/L | 0.0094 | 0.038 |
| 10/17/2016 | Equipment Blank | Pesticides | Mevinphos | 0.0094 U | µg/L | 0.0094 | 0.038 |
| 10/17/2016 | Equipment Blank | Pesticides | Parathion Methyl | 0.0094 U | µg/L | 0.0094 | 0.038 |
| 10/17/2016 | Equipment Blank | Pesticides | Prometon | 0.019 UJ | µg/L | 0.019 | 0.075 |
| 10/17/2016 | Equipment Blank | Pesticides | Sucralose | 0.010 U | µg/L | 0.01 | 0.04 |
| 10/17/2016 | Equipment Blank | Pesticides | Chlorpyrifos Ethyl | 0.0094 U | µg/L | 0.0094 | 0.038 |
| 10/17/2016 | Equipment Blank | Pesticides | Diazinon | 0.0094 U | µg/L | 0.0094 | 0.038 |
| 10/17/2016 | Equipment Blank | Pesticides | Disulfoton | 0.0047 U | µg/L | 0.0047 | 0.019 |
| 10/17/2016 | Equipment Blank | Pesticides | Metolachlor | 0.057 U | µg/L | 0.057 | 0.23 |
| 10/17/2016 | Equipment Blank | Pesticides | Metribuzin | 0.019 U | µg/L | 0.019 | 0.075 |
| 10/17/2016 | Equipment Blank | Pesticides | Fenamiphos | 0.028 U | µg/L | 0.028 | 0.11 |
| 10/17/2016 | Equipment Blank | Pesticides | Malathion | 0.0094 U | µg/L | 0.0094 | 0.038 |
| 10/17/2016 | Equipment Blank | Pesticides | Norflurazon | 0.028 U | µg/L | 0.028 | 0.11 |
| 10/17/2016 | Equipment Blank | Pesticides | Phorate | 0.0047 U | µg/L | 0.0047 | 0.019 |
| 10/17/2016 | Equipment Blank | Pesticides | Atrazine | 0.0094 U | µg/L | 0.0094 | 0.038 |
| 10/17/2016 | Equipment Blank | Pesticides | Butylate | 0.019 U | µg/L | 0.019 | 0.075 |
| 10/17/2016 | Equipment Blank | Pesticides | Ethoprop | 0.0047 U | µg/L | 0.0047 | 0.019 |
| 10/17/2016 | Equipment Blank | Pesticides | Hexazinone | 0.028 UJ | µg/L | 0.028 | 0.11 |
| 10/17/2016 | Equipment Blank | Pesticides | Parathion Ethyl | 0.019 U | µg/L | 0.019 | 0.075 |
| 10/17/2016 | Equipment Blank | Pesticides | Alachlor | 0.057 U | µg/L | 0.057 | 0.23 |

| Date Sampled | Field ID | Analysis Group | Component | Result | Units | MDL | PQL |
|---|---|---|---|---|---|---|---|
| 10/17/2016 | Equipment Blank | Pesticides | Metalaxyl | 0.038 UJ | µg/L | 0.038 | 0.15 |
| 10/17/2016 | Equipment Blank | Pesticides | Simazine | 0.0094 U | µg/L | 0.0094 | 0.038 |
| 10/17/2016 | Equipment Blank | Pesticides | Ametryn | 0.0094 U | µg/L | 0.0094 | 0.038 |
| 10/17/2016 | Equipment Blank | Pesticides | Chlorpyrifos Methyl | 0.0094 U | µg/L | 0.0094 | 0.038 |
| 10/17/2016 | Equipment Blank | Pesticides | Fonofos | 0.0094 U | µg/L | 0.0094 | 0.038 |
| 10/17/2016 | Equipment Blank | Pesticides | Naled | 0.038 U | µg/L | 0.038 | 0.15 |
| 10/17/2016 | Equipment Blank | Pesticides | Atrazine Desisopropyl | 0.0094 U | µg/L | 0.0094 | 0.038 |
| 10/17/2016 | Equipment Blank | Priority Organic Pollutants | 2,4-Dichlorophenol | 0.94 U | µg/L | 0.94 | 3.8 |
| 10/17/2016 | Equipment Blank | Priority Organic Pollutants | Anthracene | 0.19 U | µg/L | 0.19 | 0.75 |
| 10/17/2016 | Equipment Blank | Priority Organic Pollutants | Bis(2-chloroethoxy)methane | 0.94 U | µg/L | 0.94 | 3.8 |
| 10/17/2016 | Equipment Blank | Priority Organic Pollutants | Bis(2-chloroethyl)ether | 0.94 U | µg/L | 0.94 | 3.8 |
| 10/17/2016 | Equipment Blank | Priority Organic Pollutants | Bis(2-ethylhexyl)phthalate | 1.9 U | µg/L | 1.9 | 7.5 |
| 10/17/2016 | Equipment Blank | Priority Organic Pollutants | Diethyl phthalate | 1.9 U | µg/L | 1.9 | 7.5 |
| 10/17/2016 | Equipment Blank | Priority Organic Pollutants | Fluorene | 0.19 U | µg/L | 0.19 | 0.75 |
| 10/17/2016 | Equipment Blank | Priority Organic Pollutants | Nitrobenzene | 1.9 U | µg/L | 1.9 | 7.5 |
| 10/17/2016 | Equipment Blank | Priority Organic Pollutants | 2,4,6-Trichlorophenol | 0.94 U | µg/L | 0.94 | 3.8 |
| 10/17/2016 | Equipment Blank | Priority Organic Pollutants | 2,4-Dinitrotoluene | 0.94 U | µg/L | 0.94 | 3.8 |
| 10/17/2016 | Equipment Blank | Priority Organic Pollutants | Benzo(a)pyrene | 0.19 U | µg/L | 0.19 | 0.75 |
| 10/17/2016 | Equipment Blank | Priority Organic Pollutants | 2,6-Dinitrotoluene | 0.94 U | µg/L | 0.94 | 3.8 |
| 10/17/2016 | Equipment Blank | Priority Organic Pollutants | 4-Chloro-3-methylphenol | 0.94 U | µg/L | 0.94 | 3.8 |
| 10/17/2016 | Equipment Blank | Priority Organic Pollutants | Benzo(b)fluoranthene | 0.19 U | µg/L | 0.19 | 0.75 |
| 10/17/2016 | Equipment Blank | Priority Organic Pollutants | Benzo(g,h,i)perylene | 0.19 U | µg/L | 0.19 | 0.75 |
| 10/17/2016 | Equipment Blank | Priority Organic Pollutants | Hexachlorobutadiene | 2.8 U | µg/L | 2.8 | 11 |
| 10/17/2016 | Equipment Blank | Priority Organic Pollutants | Hexachloroethane | 2.8 U | µg/L | 2.8 | 11 |
| 10/17/2016 | Equipment Blank | Priority Organic Pollutants | 2,4-Dimethylphenol | 9.4 U | µg/L | 9.4 | 38 |
| 10/17/2016 | Equipment Blank | Priority Organic Pollutants | 2-Chlorophenol | 0.94 U | µg/L | 0.94 | 3.8 |
| 10/17/2016 | Equipment Blank | Priority Organic Pollutants | 2-Methyl-4,6-dinitrophenol | 2.8 U | µg/L | 2.8 | 11 |
| 10/17/2016 | Equipment Blank | Priority Organic Pollutants | 4-Nitrophenol | 14 U | µg/L | 14 | 57 |
| 10/17/2016 | Equipment Blank | Priority Organic Pollutants | Acenaphthylene | 0.19 U | µg/L | 0.19 | 0.75 |
| 10/17/2016 | Equipment Blank | Priority Organic Pollutants | Dibenzo(a,h)anthracene | 0.19 U | µg/L | 0.19 | 0.75 |
| 10/17/2016 | Equipment Blank | Priority Organic Pollutants | Indeno(1,2,3-cd)pyrene | 0.19 U | µg/L | 0.19 | 0.75 |
| 10/17/2016 | Equipment Blank | Priority Organic Pollutants | Pyrene | 0.19 U | µg/L | 0.19 | 0.75 |
| 10/17/2016 | Equipment Blank | Priority Organic Pollutants | 1,2,4-Trichlorobenzene | 0.94 U | µg/L | 0.94 | 3.8 |
| 10/17/2016 | Equipment Blank | Priority Organic Pollutants | 2-Chloronaphthalene | 0.94 U | µg/L | 0.94 | 3.8 |
| 10/17/2016 | Equipment Blank | Priority Organic Pollutants | Benzo(k)fluoranthene | 0.19 U | µg/L | 0.19 | 0.75 |
| 10/17/2016 | Equipment Blank | Priority Organic Pollutants | Bis(2-chloroisopropyl)ether | 2.8 U | µg/L | 2.8 | 11 |
| 10/17/2016 | Equipment Blank | Priority Organic Pollutants | Butyl benzyl phthalate | 0.94 U | µg/L | 0.94 | 3.8 |
| 10/17/2016 | Equipment Blank | Priority Organic Pollutants | Fluoranthene | 0.19 U | µg/L | 0.19 | 0.75 |
| 10/17/2016 | Equipment Blank | Priority Organic Pollutants | Isophorone | 0.94 U | µg/L | 0.94 | 3.8 |

| Date Sampled | Field ID | Analysis Group | Component | Result | Units | MDL | PQL |
|---|---|---|---|---|---|---|---|
| 10/17/2016 | Equipment Blank | Priority Organic Pollutants | Phenanthrene | 0.19 U | µg/L | 0.19 | 0.75 |
| 10/17/2016 | Equipment Blank | Priority Organic Pollutants | Benzidine | 94 U | µg/L | 94 | 380 |
| 10/17/2016 | Equipment Blank | Priority Organic Pollutants | Di-n-butyl phthalate | 1.9 U | µg/L | 1.9 | 7.5 |
| 10/17/2016 | Equipment Blank | Priority Organic Pollutants | Di-n-octyl phthalate | 0.94 U | µg/L | 0.94 | 3.8 |
| 10/17/2016 | Equipment Blank | Priority Organic Pollutants | Hexachlorocyclopentadiene | 2.8 U | µg/L | 2.8 | 11 |
| 10/17/2016 | Equipment Blank | Priority Organic Pollutants | N-Nitrosodiphenylamine/ Diphenylamine | 2.8 U | µg/L | 2.8 | 11 |
| 10/17/2016 | Equipment Blank | Priority Organic Pollutants | Phenol | 0.94 U | µg/L | 0.94 | 3.8 |
| 10/17/2016 | Equipment Blank | Priority Organic Pollutants | 2-Nitrophenol | 0.94 U | µg/L | 0.94 | 3.8 |
| 10/17/2016 | Equipment Blank | Priority Organic Pollutants | Benzo(a)anthracene | 0.19 U | µg/L | 0.19 | 0.75 |
| 10/17/2016 | Equipment Blank | Priority Organic Pollutants | Chrysene | 0.19 U | µg/L | 0.19 | 0.75 |
| 10/17/2016 | Equipment Blank | Priority Organic Pollutants | N-Nitrosodi-n-propylamine | 1.9 U | µg/L | 1.9 | 7.5 |
| 10/17/2016 | Equipment Blank | Priority Organic Pollutants | N-Nitrosodimethylamine | 1.9 U | µg/L | 1.9 | 7.5 |
| 10/17/2016 | Equipment Blank | Priority Organic Pollutants | Pentachlorophenol | 0.94 U | µg/L | 0.94 | 3.8 |
| 10/17/2016 | Equipment Blank | Priority Organic Pollutants | 2,4-Dinitrophenol | 14 U | µg/L | 14 | 57 |
| 10/17/2016 | Equipment Blank | Priority Organic Pollutants | 3,3'-Dichlorobenzidine | 38 U | µg/L | 38 | 150 |
| 10/17/2016 | Equipment Blank | Priority Organic Pollutants | 4-Bromophenyl phenyl ether | 0.94 U | µg/L | 0.94 | 3.8 |
| 10/17/2016 | Equipment Blank | Priority Organic Pollutants | 4-Chlorophenyl phenyl ether | 1.9 U | µg/L | 1.9 | 7.5 |
| 10/17/2016 | Equipment Blank | Priority Organic Pollutants | Acenaphthene | 0.19 U | µg/L | 0.19 | 0.75 |
| 10/17/2016 | Equipment Blank | Priority Organic Pollutants | Dimethyl phthalate | 0.94 U | µg/L | 0.94 | 3.8 |
| 10/17/2016 | Equipment Blank | Priority Organic Pollutants | Hexachlorobenzene | 0.94 U | µg/L | 0.94 | 3.8 |
| 10/17/2016 | Equipment Blank | Priority Organic Pollutants | Naphthalene | 0.19 U | µg/L | 0.19 | 0.75 |

**EPA End Sheet**

## The Bioassay of the City of St. Augustine WTP effluent sampled on October 17, 2016. NPDES #FL00757314.

Fill Out This Section For All Surface Water Discharger Inspections (CEI, CSI, CBI, PAI, XSI-RI Optional)

| Transaction Code | NPDES NUMBER | YR/MO/DA | Insp Type | Inspector | Fac Type |
|---|---|---|---|---|---|
| 1 N 2 5 | 3 F L 0 7 5 7 3 1 4 | 1 1 1 2 1 6 1 0 1 7 | 1 8 **B** | 1 9 **S** | 2 0 2 |

Remarks

6 6

## The Priority Pollutants Analysis of the City of St. Augustine WTP effluent sampled on October 17, 2016. NPDES #FL00757314.

Fill Out This Section For All Surface Water Discharger Inspections (CEI, CSI, CBI, PAI, XSI-RI Optional)

| Transaction Code | NPDES NUMBER | YR/MO/DA | Insp Type | Inspector | Fac Type |
|---|---|---|---|---|---|
| 1 N 2 5 | 3 F L 0 7 5 7 3 1 4 | 1 1 1 2 1 6 1 0 1 7 | 1 8 **X** | 1 9 **S** | 2 0 2 |

Remarks

6 6

## Biological Analyses of the City of St. Augustine WTP effluent sampled on October 17, 2016. NPDES #FL00757314.

Fill Out This Section For All Surface Water Discharger Inspections (CEI, CSI, CBI, PAI, XSI-RI Optional)

| Transaction Code | NPDES NUMBER | YR/MO/DA | Insp Type | Inspector | Fac Type |
|---|---|---|---|---|---|
| 1 N 2 5 | 3 F L 0 7 5 7 3 1 4 | 1 1 1 2 1 6 1 0 1 7 | 1 8 **S** | 1 9 **S** | 2 0 2 |

Remarks

6 6