CITY OF FORTUNA

# TOM COOKE MEMORIAL WASTEWATER TREATMENT PLANT

## 2010 ANNUAL REPORT

January 5, 2011

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## 1. Introduction

The Tom Cooke Memorial Wastewater Treatment Plant is operated by the City of Fortuna. The plant is located at 180 Dinsmore Drive, in Fortuna and serves a population of approximately 10,000. Major treatment processes include screening and grit removal, primary treatment, secondary treatment, sludge thickening, anaerobic digestion, electrical cogeneration, solids dewatering and composting, and effluent disinfection. Treated effluent is currently discharged to the percolation ponds during dry weather, and to Strong's Creek, a tributary of the Eel River, during the wet weather season. Biosolids are composted to Class A Exceptional Quality standards and either prepared for land application in the fall or given away in small quantities for private residential use. Numerous auxiliary systems are required for proper operation of many plant processes including: potable water, process water, HVAC, electrical power distribution, gas, chemicals, instrument air, and others.

The State Water Resources Control Board (SWRCB) has classified the Tom Cooke Memorial Wastewater Treatment Plant as a Class III Secondary Treatment wastewater treatment facility. The facility currently operates under the California Regional Water Quality Control Board (Regional Board) Order Number R1-2007-0007 issued on November 1, 2007. The facility came under the management of a new Chief Plant Operator on January 3rd of 2010.

This report is a summary of plant operation and performance during 2010. In addition to a discussion of effluent quality and the plant's success in meeting treatment objectives, the report contains summaries of 2010 plant operations, maintenance, chemicals, utilities, and human resources.

## 2. Summary

The plant generally operated very well throughout the entire year. This year's primary efforts have been directed toward meeting compliance with California Toxics Rule effluent limits for Disinfection Byproducts. Together with careful control of operational processes, addition of ammonia prior to chlorination to form chloramines and aeration of the plant effluent has successfully allowed the facility to temporarily meet Disinfection Byproduct limits for discharge to Strongs Creek.

The aeration basins and liquid treatment stream have been operating well as reflected by the laboratory data. However, on Saturday, January 9, 2010 at 04:27 PM, the facility was struck by a 6.5 earthquake and damage was incurred to the structure of the aeration basins inflow box, which allowed small amounts of mixed liquor to leak onto the paved area of the plant. In addition, the earthquake caused significant leaks to develop in aeration header pipe. City staff and consultants have worked diligently through the year to plan, contract, and perform repairs on the structure without interference to treatment efficiency or continuity. Repairs to the aeration

basin and the aeration header pipe were essentially complete during 2010, with final paving and clean up being finished in January of 2011.

Also in January of 2010, there was one instance when the plant effluent exceeded the permit limit for total Coliform. During the same week, the facility received a slug load of petroleum and chemical waste from an unknown source, which severely impacted plant operations and cost over $15,000 to remediate. One week later, a person or persons unknown tampered with the control valve for discharge to the percolation ponds, which resulted in effluent flowing onto the plant grounds. The City's Police Department investigated the incident as a criminal vandalism but was unable to identify the party responsible.

Additionally, we have again passed the chronic toxicity testing performed on February 22 through 26, 2010. We believe recent test results indicate that previous unsatisfactory chronic toxicity test results completed in 2008 were adversely influenced by our dechlorination system. To that end, we have continued to improve our automatic dechlorination control system to provide continuous protection against chlorine discharge and to limit effluent toxicity due to Sulfur Dioxide residuals.

As of the date of this report, we have also passed all of our acute toxicity testing, but had to resubmit a sample for February 2010 due to a laboratory error.

Due to careful monitoring and programming of the new dechlorination equipment, there was only one instance when chlorine was detected in the effluent discharged to Strong's Creek this year, when a Sulfur Dioxide regulator became plugged due to a contaminated cylinder in February. Facility staff noted the problem immediately due to standardized process control testing procedures and repaired the equipment and replaced the problematic cylinder.

However, there was one occasion in each June and July, three occasions in August, two occasions in September, and one occasion each in October and December when disinfection basin chlorine residuals fell below the permit requirement of 1.5 mg/L for brief periods due to fluctuations in secondary effluent ammonia content and plant flow as a result of routine cleaning operations. In all instances, the disinfection basin chlorine residual was below permit requirements for a period of less than one hour.

In March, during a shortage of staff due to illness, the operator filling in for the Lab Director failed to perform a settleable solids analysis of our effluent as required by our permit.

Twice during the month of August and once in October, we were unable to obtain a measurement of our effluent Biochemical Oxygen Demand (BOD). Also during August, there was one occasion when our effluent Coliform exceeded our permit limit.

Our Laboratory Director resigned to pursue other opportunities on August 20$^{th}$, and the City obtained ELAP approval of interim Shift Supervisor Andrew Bowles as interim Laboratory Director. In addition to the loss of the previous Laboratory Director, the facility experienced the resignation of one Grade II operator in July and another Grade II operator in September, which

resulted in significant staffing challenges for the facility. City staff and Council are involved in discussions on future staffing levels at the WWTP.

In November, repairs began on the earthquake damage sustained in January. During the periods in which the plant was taken offline to effect repairs, staff utilized alternative aeration methods and approximately 800 pounds per day of dog food to sustain the microorganisms necessary to maintain treatment efficiency upon return to service. During start up in November, and again in December, the plant did have one Coliform test each month which exceeded our permit limit.

The WWTP maintained discharge to the percolation ponds, Discharge Point 003, until December 29th, when high flows and high river levels impeded percolation and staff diverted discharge to Strongs Creek, Discharge Point 001. At that time, laboratory staff obtained a result of 3mg/L on a suspended solids test of our influent which significantly lowered our monthly percent removal of that constituent. However, the average monthly efficiency remained above the required 85% removal.

Other major challenges included complete implementation of new requirements contained in our 2007 Discharge Permit. These include flow dilution studies in Strong's Creek and testing to evaluate the performance of the dry weather percolation ponds. In October, the City requested issuance of a Cease and Desist order from the Regional Board in respect to California Toxic Rule (CTR) effluent limitations. During the interim, facility staff implemented operational changes and utilized chloramination and post aeration to effectively meet CTR requirements. These operational changes are not likely the permanent solution to meeting the CTR effluent limitations, and a timeline and work plan were included in the Cease and Desist request to identify the permanent solution to meet these discharge requirements.

In 2010, the City completed a Copper Water Effects Ratio Study which it submitted to the Board, and Board staff has prepared a new Discharge Permit for the WWTP which was approved on January 27th of 2011. The new permit removes the copper limits and extends the current discharge limits until 2016.

## 3. OPERATIONS

### *a. Pretreatment*

In 2010 the City of Fortuna, with the assistance of Freshwater Environmental Services, began drafting a comprehensive Sanitary Sewer Management Plan (SSMP) with the overall goal of reducing and preventing Sanitary Sewer Overflows (SSOs) within the City. Among other things, the City of Fortuna's SSMP provides guidelines for regular, proactive maintenance of the system to remove and control roots, debris, and fats, oils and grease (FOG) that may cause SSOs.

In October of 2010, City staff began implementing the FOG Control Program (Element 7 of the City's draft SSMP) by conducting regular inspections of pretreatment devices at food service establishments within the City under the authority of the current Fortuna Municipal Code. The Municipal Code requires interceptors, when necessary, at food service establishments and also

requires that they be regularly maintained. Inspection procedure includes an informal interview of the food service establishment's Owner or Manager regarding their existing infrastructure and kitchen practices, and an educational discussion of FOG source control. The Owner or Manager may be provided with informational posters or literature regarding kitchen procedures and Best Management Practices during the inspection. Grease traps and interceptors are inspected and maintenance records are requested to provide proof of servicing. If applicable, sewer laterals may be scoped by a hand-held camera to determine the presence of FOG buildup. Violations are documented and proof of corrective actions is required. While these compliance inspections are in their early stages, staff has preliminarily identified the South Fortuna Boulevard area as a potential "hot spot" for FOG discharge based upon the presence of multiple fast food establishments and other purveyors of greasy food. No particular food service establishments in this area are under surveillance by the City; however, staff continues to gather evidence to identify potential sources of FOG in this area, and throughout the City.
The City of Fortuna is currently developing a FOG source control policy which would look to amend the City's Sewer Use Ordinance to include a FOG Ordinance as well as a Grease Hauler Permit Ordinance. A FOG enforcement response plan will be included to provide additional enforcement authority, and to outline a permitting process for FOG dischargers as well as for licensed grease haulers.

During the year, City of Fortuna utilities crews continued to inspect sanitary sewer manholes and other infrastructure for inflow and infiltration that may contribute to unnecessary volumes of waste water to be treated.

In 2010 the Compliance Coordinator for the City of Fortuna organized an educational program for the local Cub Scouts (Pack #47) regarding FOG and its effects on a sanitary sewer system for public education and outreach purposes. Cub scouts were given informational literature as well as items such as plastic grease-scrapers, and were given the opportunity to assist in a compliance inspection.

### *b. Influent Treatment and Quality*

The plant operates at an average dry weather flow of 1.0 Million Gallons per Day (MGD), and during wet weather can experience flows above 6.5 MGD. During high flow periods, plant influent is partially diverted to flow equalization ponds to allow the plant flow to remain at a controlled uniform rate below the plant's current sustained wet weather operational capacity of 3.8 MGD.

A summary of annual flow and influent parameter concentrations for the past two years is shown in Table 1. The plant experienced a 9% increase in mean influent flow from 2009 to 2010.

**Table 1: Influent Parameters**

| | 2009 | 2010 |
|---|---|---|
| Mean Influent Flow, MGD | **1.115** | **1.216** |
| Total Annual Flow, MG | **421.1** | **443.7** |
| Mean Influent SS, mg/L | **348** | **396** |
| Mean Influent $BOD_5$, mg/L | **311** | **307** |

### c. *Preliminary Treatment*

The preliminary treatment process includes screening and grit removal as well as influent flow monitoring.

Wastewater enters the treatment facility at the headworks structure, which provides a grit and screenings removal operation. There is one automatic stair-stepper type bar screen. This screening machine removes rags and large pieces of debris from the wastewater. Grit channels located downstream of the screen remove sand, gravel and similar heavy inorganic material by gravity separation. The grit channel operates at a lower velocity than standard because organics allowed to fall out of the waste stream are separated by a cyclone grit classifier and returned to the plan influent wet well. The grit and screenings are collected and hauled to a sanitary landfill site.

The quantity of grit and screenings removed by the grit channels and mechanical bar screen averaged approximately 3.8 $ft^3$/day in 2010.

### d. *Primary Treatment*

After the grit channels, the next wastewater treatment process is primary sedimentation where the velocity of flow entering the clarifier tanks is reduced, allowing the heavier solids in the wastewater to settle to the bottom by gravity. Sludge collectors in the tanks sweep the settled sludge (primary sludge) into a sludge hopper located on the bottom of the tank, from where the sludge is pumped to the anaerobic digester. There are three circular primary clarifiers. By varying the number of units online, staff implemented a control strategy to optimize secondary treatment by providing adequate carbon material to effect nutrient removal with controlled performance efficiencies in the primary clarifiers.

Table 2 contains a summary of key primary treatment effluent parameter concentrations over the previous two years.

**Table 2: Primary Treatment Effluent Parameters**

| | 2009 | 2010 |
|---|---|---|
| Mean Primary Effluent SS, mg/L | **63** | **94.4** |
| Mean Primary Effluent $BOD_5$, mg/L | **98.2** | **266** |

### e. *Secondary Treatment*

The secondary treatment process includes biological treatment of the waste stream as well as solids separation processes.

In the activated sludge process, effluent from the primary clarifiers is mixed with Return Activated Sludge (RAS) from final clarifiers and is aerated in aeration basins. The activated sludge is primarily comprised of micro-organisms and bacteria, which are a natural part of wastewater and are used to break down the organic solids in the wastewater. Micro-organism are

monitored microscopically weekly by operations and laboratory staff to confirm number, type, and general health of the process.

In August of 2010, staff installed a mixed liquor recycle system to allow denitrification for removal of Nitrate Nitrogen from the waste stream. This process will improve the secondary treatment process by returning a portion of the alkalinity removed during the nitrification process and reducing the need for caustic soda addition.

The mixed liquor from the aeration basins flows to large quiescent final clarifiers where the activated sludge is allowed to settle. A controlled quantity of this sludge is "returned" to the aeration basins as Return Activated Sludge (RAS) to repeat the treatment process, and excess quantities are removed as waste activated sludge (WAS) to the WAS holding tank. There are five final clarifiers, and the number in operation is adjusted to optimize performance during varying flow conditions. The WWTP effectively used fewer microorganisms at a higher rate to achieve greater treatment of the waste stream. By effectively reducing the age of the microorganisms, staff were able to reduce excess suspended solids and produce a better quality of effluent.

A summary of key aeration basin parameters for the previous two years is shown in Table 3.

**Table 3: Secondary Treatment Process Parameters**

| | 2009 | 2010 |
|---|---|---|
| Mean Aeration Loading, lb $BOD_5$/day | **1400** | **2700** |
| Mean Mixed Liquor Suspended Solids, mg/L | **3000** | **2180** |
| F:M Ratio | **0.05** | **0.25** |
| Mean Cell Residence Time, days | **28** | **16** |

### *f. Final Effluent Treatment and Quality*

Chlorine gas is used to disinfect the final effluent before it is discharged. During winter flows when discharge to Strong's Creek may be required, the plant now utilizes a chloramination process wherein ammonia is fed into the chlorine feed water at a carefully controlled dosage to limit the formation of Disinfection Byproducts.

Aeration has been added immediately prior to discharge to further reduce Disinfection Byproducts and raise effluent pH. In 2010, the plant continued to produce a high quality effluent.

A summary of key final effluent parameters for 2010 is shown in Table 4.

Details of the final effluent qualities are presented in graphical form in Appendix A.

## Table 4: Treated Wastewater Parameters 2010

| | Jan | Feb | Mar | April | May | Jun | July | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Unionized Ammonia Nitrogen (mg/L) | 0.0003 | 0.0014 | ND | ND | 0.002 | ND | 0 | 0.0014 | ND | 0.00069 | 0.034 | 0.027 |
| Ammonia Nitrogen (mg/L) | 0.22 | 0.23 | ND | ND | 1.1 | ND | 0.38 | 0.36 | ND | 0.3 | 13 | 12 |
| Total Phosphate Phosphourous (mg/L) | 1.6 | 3 | 1.7 | 1.5 | 3.3 | 4.4 | 4.3 | 4.6 | 4.9 | 2.3 | 4.7 | 4.8 |
| Nitrate as nitrogen (mg/L) | 12 | 8.2 | 10 | 5 | 7.6 | 26 | 16 | 12 | 23 | 14 | 12 | 1 |
| Copper (ug/L) | 23 | 20 | 13 | 10 | 17 | 19 | 9.7 | 11 | 13 | 14 | 12 | 7.6 |
| Zinc (ug/L) | 39 | 49 | | | | | | | | | | |
| Chloroform (ug/L) | | | | | | | | | 22 | | 17 | 3.4 |
| Bromodichloromethane (ug/L) | 3.2 | 6.7 | 3.1 | 5.6 | 1.1 | 8.7 | 2.6 | 1.5 | 3.1 | 3.8 | 3.1 | 0.58 |
| Dibromochloromethane (ug/L) | ND | 1.1 | ND | 1.3 | ND | 1.1 | ND | ND | ND | ND | 0.2 | ND |

| | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EFFLUENT BOD | | | | | | | | | | | | |
| Max | 9.4 | 7.7 | 5.4 | 7 | 9.9 | 15 | 18 | 7.7 | 3.5 | 3.9 | 16.8 | 7.4 |
| Mean | 7.2 | 5.7 | 4.4 | 4.9 | 7.4 | 10.4 | 9.4 | 5.2 | 2.1 | 2.8 | 13.1 | 4 |
| EFFLUENT TSS | | | | | | | | | | | | |
| Max | 21 | 10.5 | 6.1 | 11 | 13 | 15.1 | 12 | 9.2 | 4.9 | 3.9 | 27.6 | 11.5 |
| Mean | 17 | 8.9 | 4.3 | 7.4 | 8.9 | 9.4 | 5.9 | 6.9 | 3.2 | 3.4 | 15.2 | 5.3 |
| EFFLUENT FLOW | | | | | | | | | | | | |
| Max | 2.86 | 2.18 | 2.5 | 2.34 | 1.59 | 1.6 | 1.3 | 1.3 | 1.3 | 2.09 | 2.24 | 3.81 |
| Mean | 1.78 | 1.42 | 1.59 | 1.72 | 1.17 | 1.08 | 1.1 | 1 | 1.1 | 1.16 | 1.33 | 2.32 |
| SETTLEABLE SOLIDS | | | | | | | | | | | | |
| Max | 0.2 | <0.1 | <0.1 | <0.1 | <0.1 | | | | | | | <0.1 |
| Mean | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | | | | | | | <0.1 |
| COLIFORM MPN | | | | | | | | | | | | |
| Max | 240 | 23 | 22 | 240 | 30 | 11 | 2 | 300 | 7 | 12 | 300 | 300 |
| Median | 14 | 11 | 7 | 17 | 16 | <2 | 2 | <2 | 3 | <2 | 2 | <2 |
| HYDROGEN ION | | | | | | | | | | | | |
| Max pH | 7 | 7.3 | 7.3 | 7.1 | 7.2 | 6.9 | 7.1 | 7.2 | 7.2 | 7.3 | 7.3 | 7.7 |
| Min pH | 6.4 | 6.9 | 7 | 6.5 | 6.4 | 5.8 | 6.8 | 7 | 6.9 | 6.9 | 6.5 | 6.9 |

BASIN CHLORINE RESIDUAL

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Max | 5.7 | 10.6 | 5.9 | 6 | 7.8 | 8 | 21.2 | 9.4 | 10.2 | 9.8 | 19.3 | 10.8 |
| Mean | 3.8 | 4.8 | 4.3 | 4 | 3.8 | 5.1 | 9.6 | 4.3 | 4.3 | 4.6 | 7.4 | 5.6 |

### g. *Solids Handling*

The anaerobic digestion process reduces sludge volume and stabilizes the solids to form biosolids. In 2010, an average of 1350 lb/day of raw sludge from primary treatment was pumped to the anaerobic digester for treatment. Average total solids (TS) concentration of raw sludge was 3.6% and total volatile solids content was 85.5% of TS. Waste activated sludge (WAS) was diverted from the mixed liquor recycling line to eliminate fluctuations in digester feed rates due to variations in RAS concentrations and pumped to the anaerobic digester after processing through the gravity belt thickener. In 2010, approximately 800 lb/day of WAS was thickened and sent to the digester. The average thickened waste activated sludge (TWAS) total solids concentration was 5.9%.The average hydraulic retention time of sludge in the anaerobic digesters was 83 days.

Using a new process identified and refined in 2009, approximately 192 dry metric tons of biosolids were produced and composted to Class A Exceptional Quality standards in 2010. The WWTP had 2 years of stockpiled biosolids as well as the continued production to process when we began the pilot project in 2009. In June of 2010, the City applied 1030 cubic yards, about 460 tons, of compost to agricultural land in nearby Alton.

Additionally, in July the WWTP began offering compost to the public free of charge, and in 2010 gave away over 870 cubic yards of compost to Fortuna residents for use in private home applications for landscaping and gardening. The WWTP began a biosolids demonstration garden which was featured in the Times Standard 'Lifestyles' section and helped win overwhelming public support of the biosolids compost operation.

Overall, public reception of the new process has been outstanding. The new process utilizes green waste from City curbside pickup as well as green material from the local solid waste facility and diverts approximately 1500 cubic yards of waste from the solid waste stream annually.

The success of the compost operation has prompted other agencies to express interest in utilizing the City's composting program for beneficial reuse of their biosolids and/or developing a regional facility.

Biosolids and biosolids compost are composted for 15 days at temperatures in excess of 140 degrees to destroy pathogens and are tested quarterly for metals content to ensure Exceptional Quality status and safety of the finished material. Results of tests performed in 2010 are presented in the following tables.

## Table 5: Dewatered Sludge Metals 2010

Dewatered sludge, mg/kg

| | 1st Quarter | 2nd Quarter | 3rd Quarter |
|---|---|---|---|
| Chromium (Cr) | 33 | 31 | 6.7 |
| Nickel (Ni) | 33 | 37 | 7.1 |
| Copper (Cu) | 800 | 600 | 120 |
| Zinc (Zn) | 1200 | 870 | 170 |
| Arsenic (As) | 3.2 | 2.6 | 0.61 |
| Selenium (Se) | 10 | 8.1 | 1.7 |
| Molybdenum (Mo) | 17 | 14 | 2.1 |
| Cadmium (Cd) | 4.1 | 3.3 | 0.7 |
| Mercury (Hg) | 1.7 | 1.4 | 0.21 |
| Lead (Pb) | 65 | 55.0 | 10.0 |

## Table 6: Unscreened Compost Metals 2010

Unscreened Compost, mg/kg

| | 1st Quarter | 2nd Quarter | 3rd Quarter |
|---|---|---|---|
| Chromium (Cr) | 15 | 44 | 47 |
| Nickel (Ni) | 14 | 67 | 44 |
| Copper (Cu) | 120 | 450 | 280 |
| Zinc (Zn) | 210 | 760 | 490 |
| Arsenic (As) | 2.6 | 7.4 | 7.5 |
| Selenium (Se) | 1.7 | 5 | 3.4 |
| Molybdenum (Mo) | 2 | 4.8 | 2 |
| Cadmium (Cd) | ND | 2.7 | 0.51 |
| Mercury (Hg) | ND | 0.4 | 65 |
| Lead (Pb) | 25.0 | 71.0 | 10.0 |

**Table 7: Screened Compost Metals 2010**

| Screened Compost, mg/kg | 1st Quarter | 2nd Quarter | 3rd Quarter |
|---|---|---|---|
| Chromium (Cr) | 26 | 29 | 50 |
| Nickel (Ni) | 20 | 28 | 54 |
| Copper (Cu) | 180 | 240 | 230 |
| Zinc (Zn) | 300 | 430 | 470 |
| Arsenic (As) | 3.4 | 4.4 | 5.4 |
| Selenium (Se) | 2.2 | 3 | 3.8 |
| Molybdenum (Mo) | 3.2 | 7.4 | 1.7 |
| Cadmium (Cd) | 1.1 | 1.3 | 0.38 |
| Mercury (Hg) | 0.3 | ND | 54 |
| Lead (Pb) | 32.0 | 45.0 | 10.0 |

## 4. MAINTENANCE

### *a. Maintenance Summary*

The WWTP performed a variety of scheduled, preventative, predictive and breakdown maintenance on a diverse spectrum of equipment. The main goal of maintenance activities is to ensure equipment availability to meet plant process operation requirements.

### *b. Flow Meter Calibration Record*

Flow to the plant is measured at the headworks and chlorine contact basin effluent weir. The annual calibration of flow meter equipment was completed on August 15th, 2010 and found to be within design parameters.

### *c. WWTP*

The WWTP work area includes all major and auxiliary processes. Maintenance minimizes callouts, reduces overtime costs, limits potential for discharge violations due to mechanical failure, and costs associated with repairs are significantly lower than replacement costs.

In addition to routine lubrication and preventative maintenance activities, the following major emergency and predictive maintenance was completed in 2010:

- Inspected and installed new blower air filters
- Replaced bearings on belt filter press feed box
- Repaired belt on belt filter press
- Installed new motor and bearings on belt filter press
- Installed new belt and bearings in grit pumps
- Replaced sump water lines on grit system
- Installed new wearing shoes on grit flights

- Removed, inspected and changed oil in influent pumps
- Cleaned and changed oil in all 5 circular clarifiers
- Installed new stator and rotor in primary sludge pump
- Installed new belts in return sludge pumps
- Installed new mechanical seal in return sludge pump
- Lubricated stair screen and washer press
- Replaced solenoid valve and water line to washer press
- Repaired wear plates on stair screen
- Painted #1 primary clarifier
- Stripped and painted #4 secondary clarifier
- Installed new plug valve in #2 primary clarifier
- Changed oil and filters in auxiliary generator
- Repaired wash water pump impeller for belt filter press
- Installed temporary aeration line for effluent
- Plumbed temporary aeration line for plant shut down for earthquake repairs
- Installed new pump and motor at Nob Hill Lift Station
- Installed new impeller and wearplates at Strongs Creek Lift Station
- Installed new compressor and pressure transducer for Rancho Buena Vista Lift Station
- Replaced defective compressor at Laurelwood Lift Station

## 5. CHEMICALS AND UTILITIES

### *a. Chemicals*

Several chemicals are used for a variety of treatment processes at the plant. Major process chemicals are discussed below and include:

- Sodium Hydroxide (Nutrient Removal, pH adjustment)
- Chlorine gas (Disinfection)
- Sulfur Dioxide gas (Dechlorination)
- Ammonia Hydroxide

#### i. Sodium Hydroxide for Nutrient Removal and pH Adjustment

Sodium Hydroxide consumption for nutrient removal (i.e. ammonia, nitrate, and nitrite) during 2010 was approximately 36.5 tons. This is a significant increase over 2009 levels due to the increased demand for alkalinity associated with nitrification. Sodium Hydroxide was applied to the mixing box upstream of the aeration basins and, if necessary, prior to discharge to Strongs Creek.

#### ii. Chlorine for Disinfection

Chlorine is used for disinfection of the final effluent. In 2010, approximately 27.3 tons was consumed for this purpose.

#### iii. Sulfur Dioxide for Dechlorination

Sulfur Dioxide is used for dechlorination of the final effluent prior to discharge to Strong's Creek. In 2010, approximately 6 tons was consumed for this purpose.

#### iv. Ammonia Hydroxide

Ammonia Hydroxide is used to eliminate free, uncombined chlorine and limit Disinfection Byproduct formation. The process was begun in November, so an accurate estimate of annual usage is not yet available. During November and December, approximately 0.5 tons of ammonia hydroxide were consumed.

### *b. Utilities*

Several utilities are used for operation of the plant. Major utilities are:

- Potable water
- Electricity
- Natural gas
- Reclaimed water
- Cogeneration power

#### i. Water

The WWTP has two potable water lines with backflow protection devices. Currently, only one is metered, with plans to install an additional meter in 2011. Total metered potable water consumption in 2010 was approximately 2.24 million gallons. The overall metered water usage cost in 2010 was approximately $40,700.

#### ii. Electricity

Total electrical consumption in 2010 was 1,062,011kwh. The overall electricity cost in 2010 was approximately $139,500.

#### iii. Natural Gas

Total natural gas consumption in 2010 was18,988 therms. The overall natural gas cost in 2010 was approximately $17,000.

#### iv. Reclaimed Water

The total amount of water reclaimed from the treated effluent for use in the treatment plant was not accurately totaled throughout most of the year due to breakdowns of metering equipment, but reclaimed water usage averaged 60,000 gallons per day for an estimated reclaimed water usage of 22 million gallons in 2010, thereby significantly reducing the City's demand for potable water by this amount.

#### v. Cogeneration

During the year, we operated the cogeneration unit for 124.5 hours at 85 kilowatts (kw). Approximately 36 of those hours were during Peak Day Pricing events. Due to start-up conditions, we were not able to operate the cogeneration unit everyday; therefore, we were not able to significantly reduce the monthly peak demand below the average of 225 kw. However, during the next year, we expect to operate the cogeneration unit daily and hope to lower the peak demand.

## 6. HUMAN RESOURCES

### *a. Staffing*

In 2010, the treatment plant had 8 employees. During 2010, the WWTP Laboratory Director resigned to pursue other opportunities and the City recruited a new Lab Technician with considerable experience to fill the vacancy. Two Grade II operators also resigned in 2010, and the City began recruiting for those vacancies in December. Plant staffing for 2010 is shown in Table 8.

**Table 8: Plant Staffing**

| | |
|---|---|
| Chief Plant Operator | 1 |
| WWTP Operator | 5 |
| Plant Maintenance Mechanic | 1 |
| Lab Director | 1 |

### *b. Staff Training & Development*

In addition to weekly safety meetings, the WWTP has developed a comprehensive Operator Training Program that expands the abilities of the operational staff, resulting in better service to the public, and better, more efficient operation of the facility. Accreditation has been received to conduct in-house trainings meeting Continuing Education requirements, and these training opportunities have been offered to other municipalities and agencies, free of charge, to assist other local treatment facilities in improving their operational knowledge and to provide local training and staff development opportunities to help minimize the cost of training on facility budgets strained by the current economic landscape. WWTP operating staff conducted and/or attended the following trainings:

- CPR
- Chlorine Safety
- First Aid
- Coliform Testing
- Electrical Controls
- Hydraulics and Mathematics
- Coagulation and Flocculation
- Suspended Growth Treatment Systems
- Pumps and Motors
- Distribution and Collections
- Driver Safety

### *c. Operator Certification*

The WWTP has incorporated two Shift Supervisor positions into the organizational structure of the water and wastewater treatment facilities. This allows for operational and process changes to be made when needed, including during weekends, in accordance with SWRCB Office of Operator Certification guidelines, and provides the required two operators on duty at all times. While this demonstrates compliance with the regulations of the Office of Operator Certification,

it also provides sufficient levels of staffing and improves staff safety during Holidays and weekend shifts.

The following table summarizes the status of operator certification held by WWTP operators at the facility during 2010.

**Table 9: Wastewater Treatment Certifications**

| | |
|---|---|
| Grade III | 1 |
| Grade II | 5 |
| O.I.T. | 2 |

In addition, senior City staff members hold two additional Grade III wastewater certifications. Additional certifications held by WWTP staff include Laboratory Analyst, Water Treatment, and Biosolids Management certifications.

## 7. Certification of Report

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is to the best of my knowledge and belief, true, accurate, and complete. I am aware there are significant penalties for submitting false information, including fine and imprisonment for withholding information regarding permit violations.

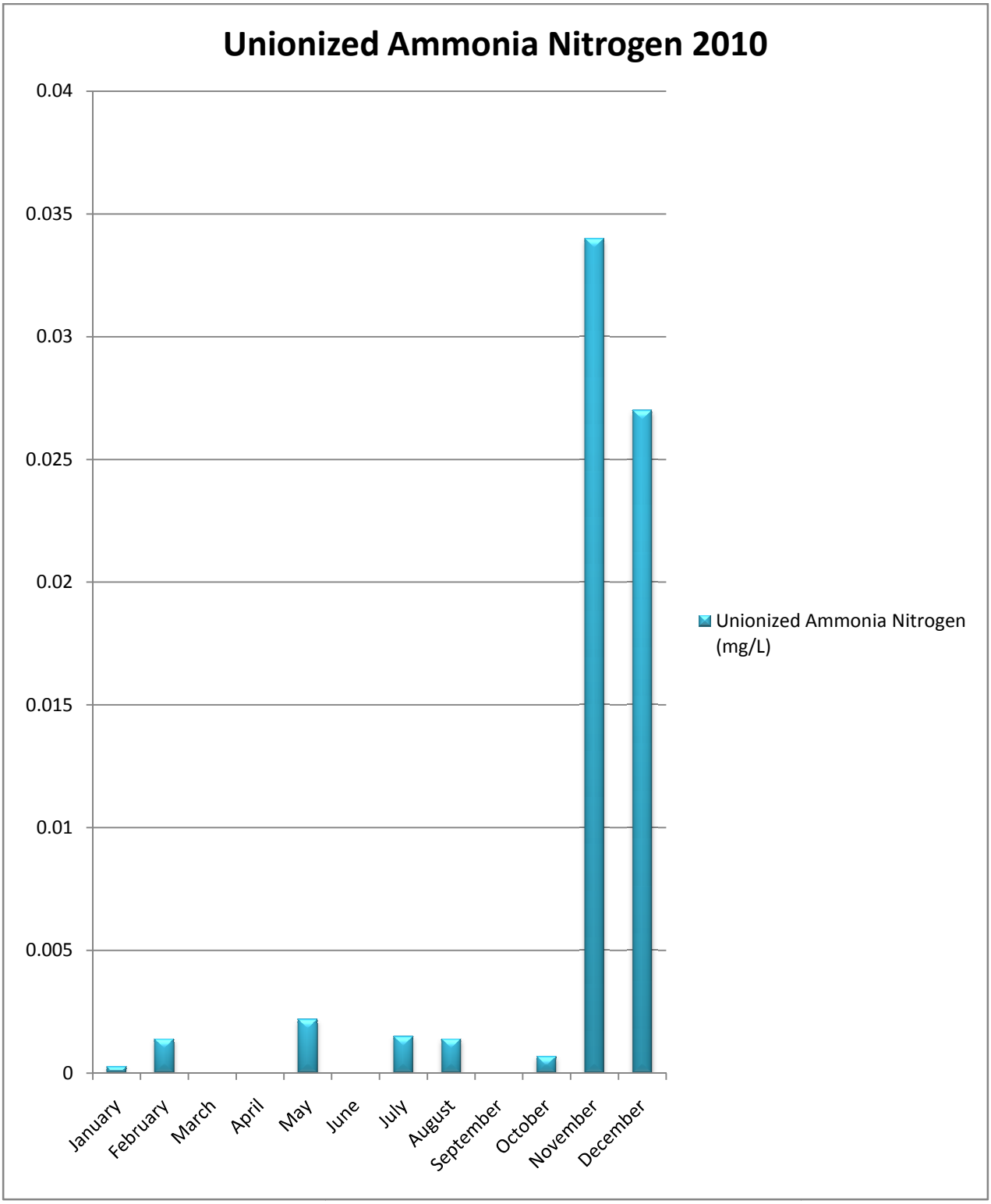
If you have any questions or need additional information, please feel free to contact me at hbrenard@ci.fortuna.ca.us or (707)725-1476.

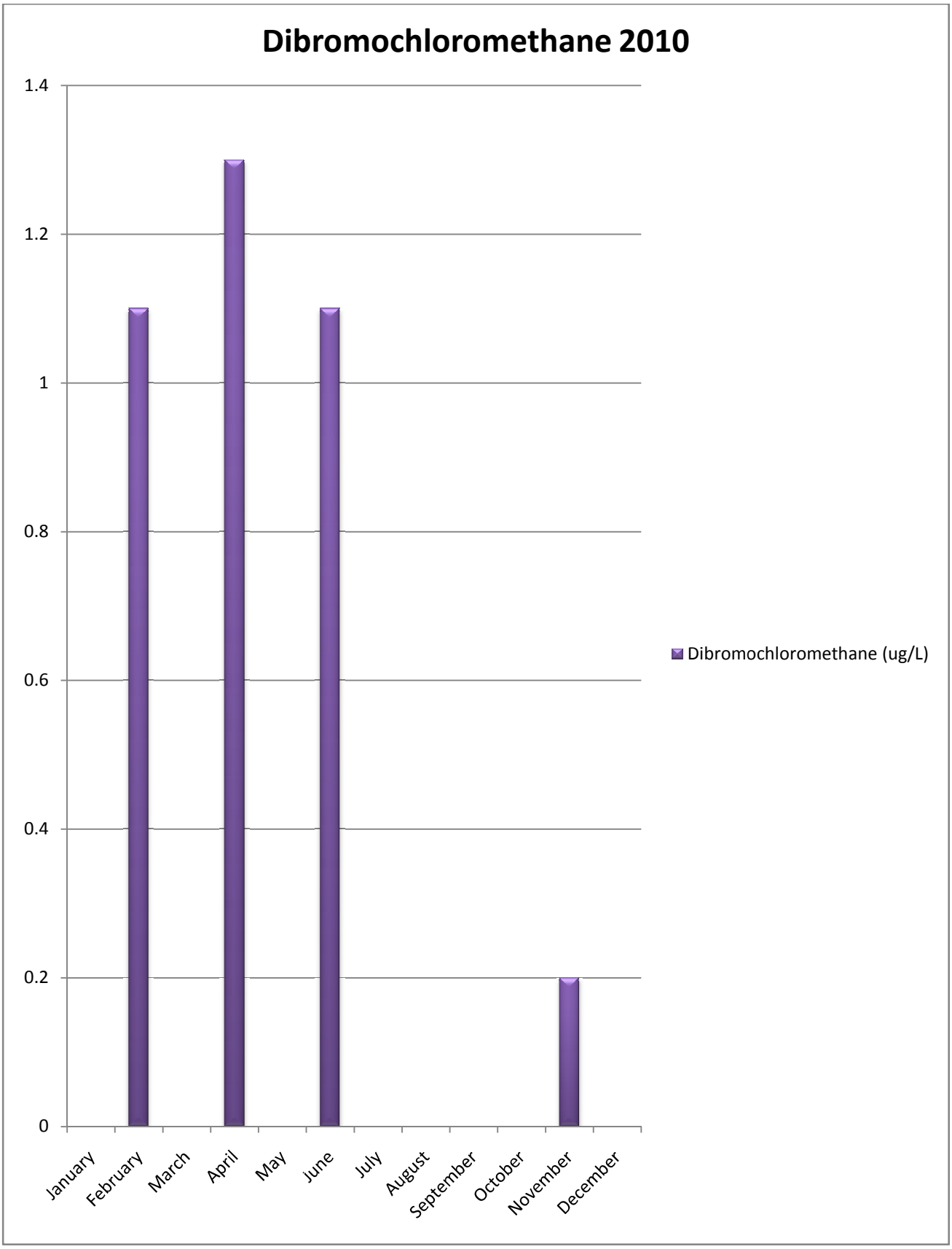
Sincerely

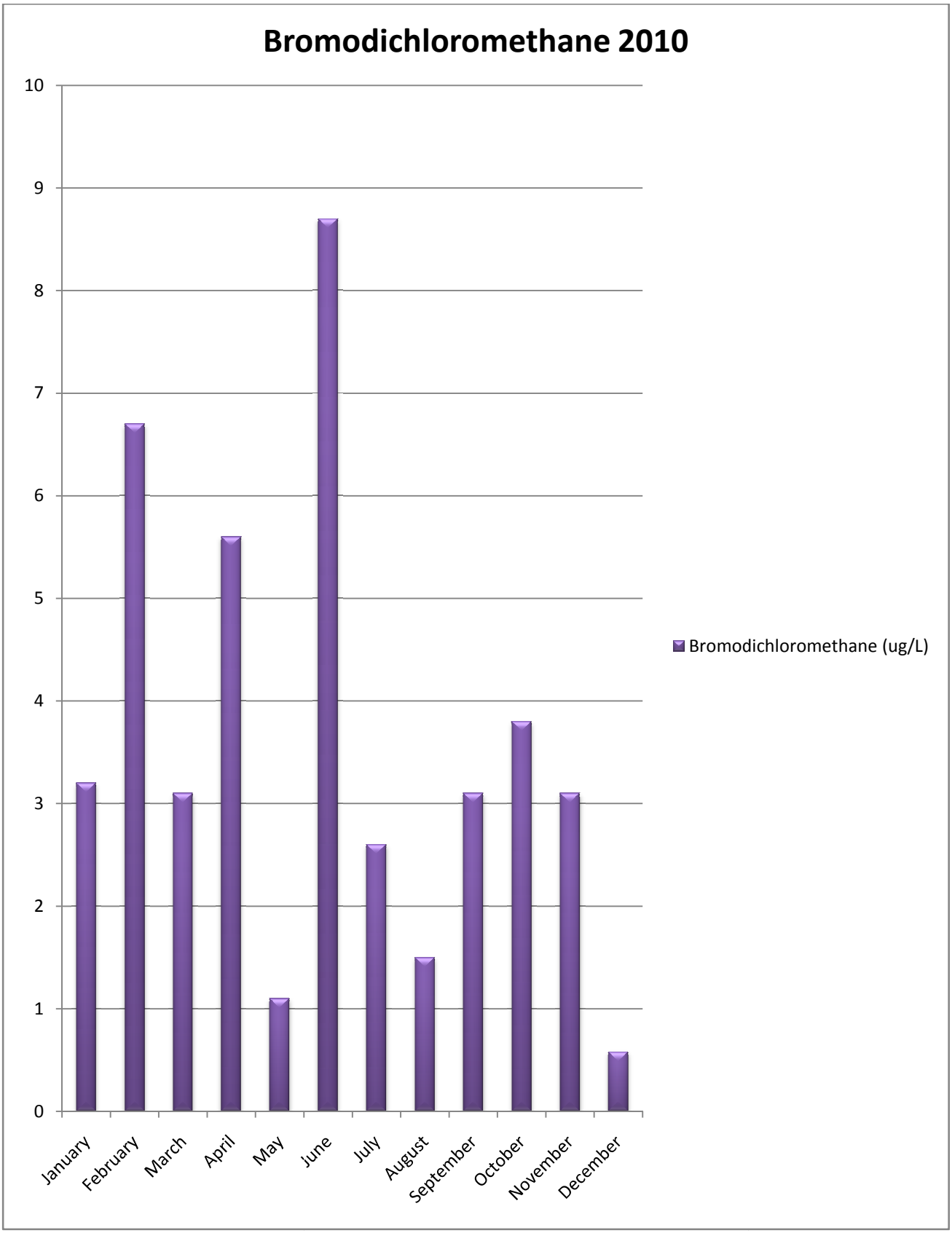
Hank Brenard, WWTPO III-28479
Chief Plant Operator
Tom Cooke Memorial WWTP

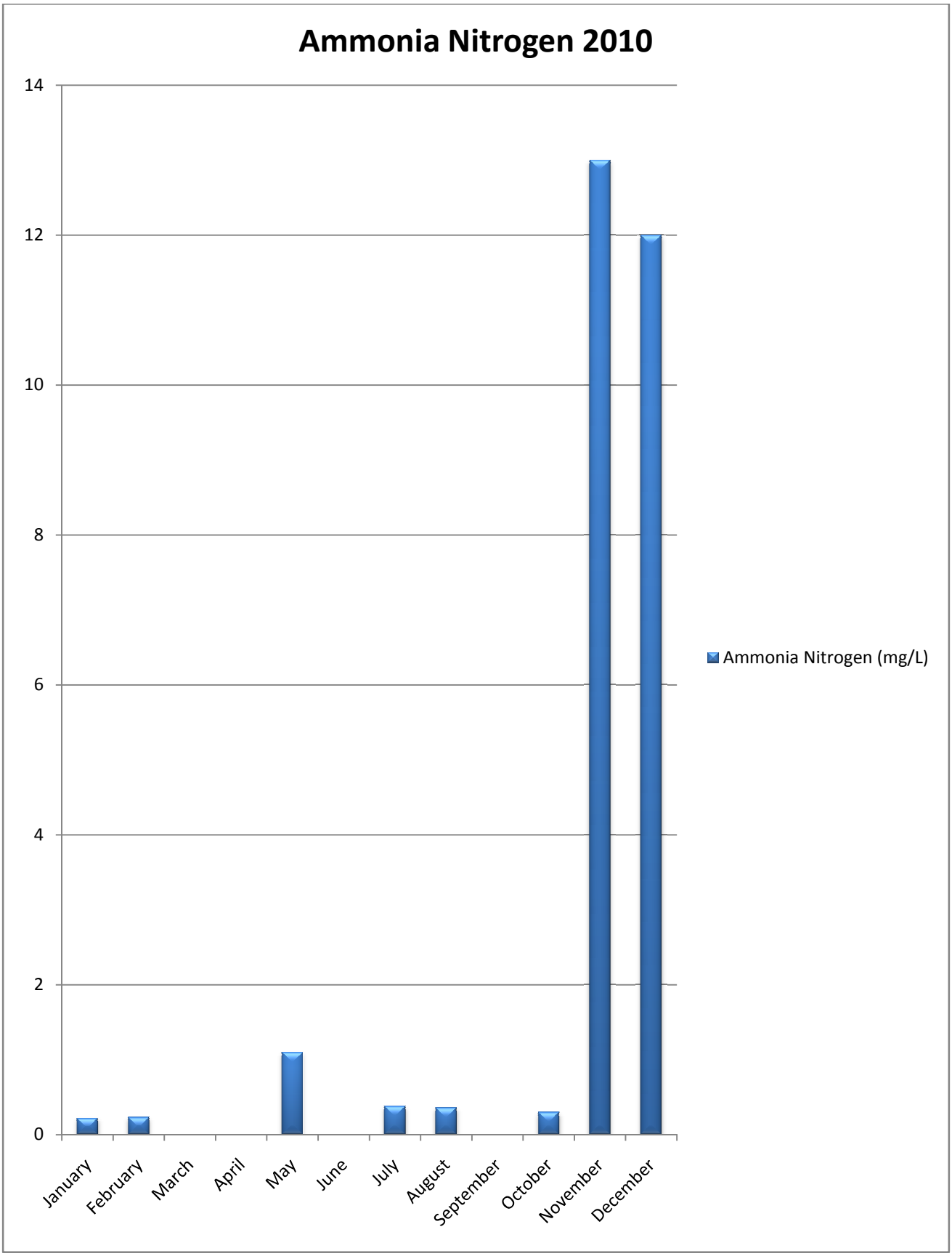
# Appendix A

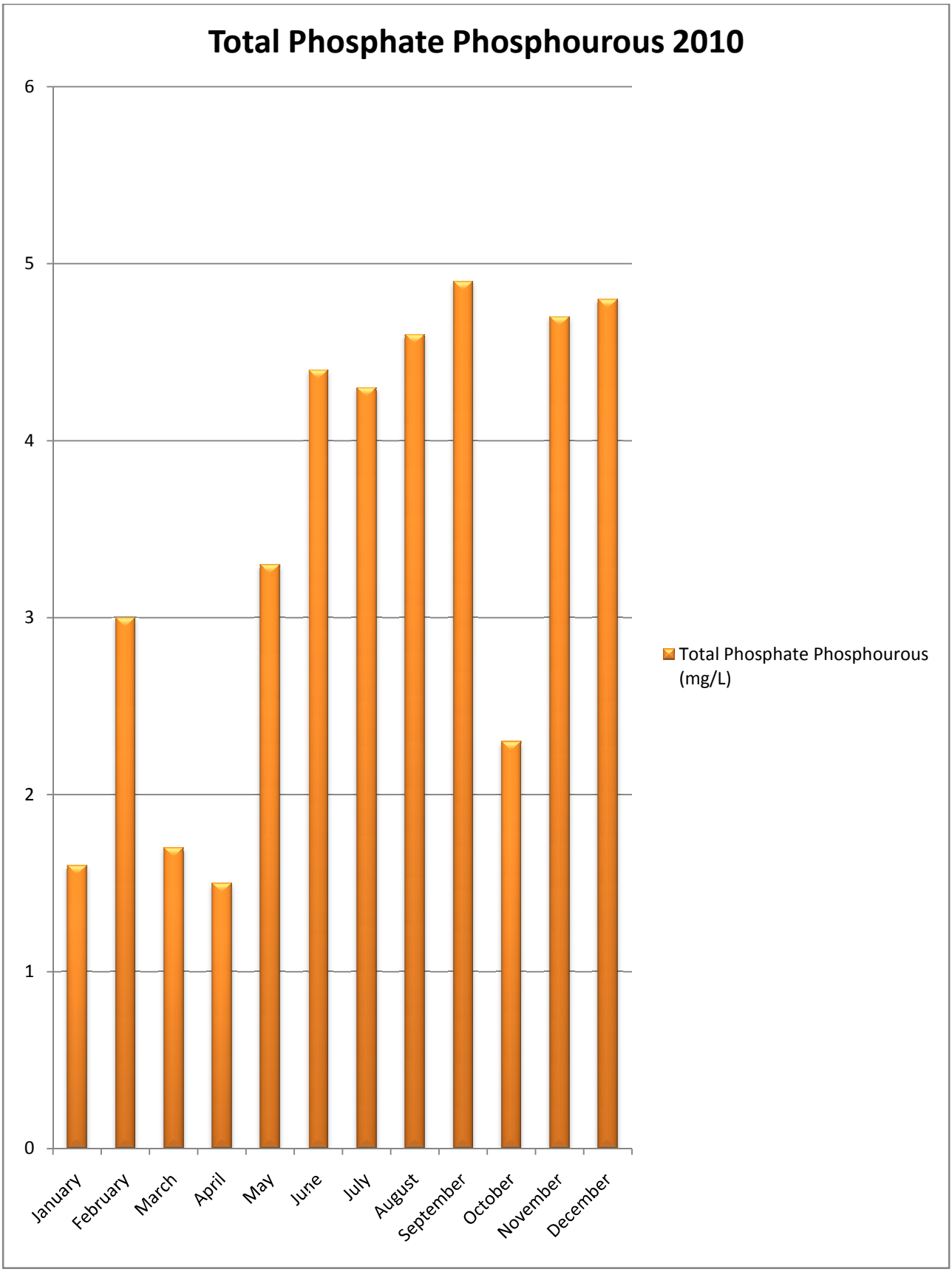
# Performance Charts

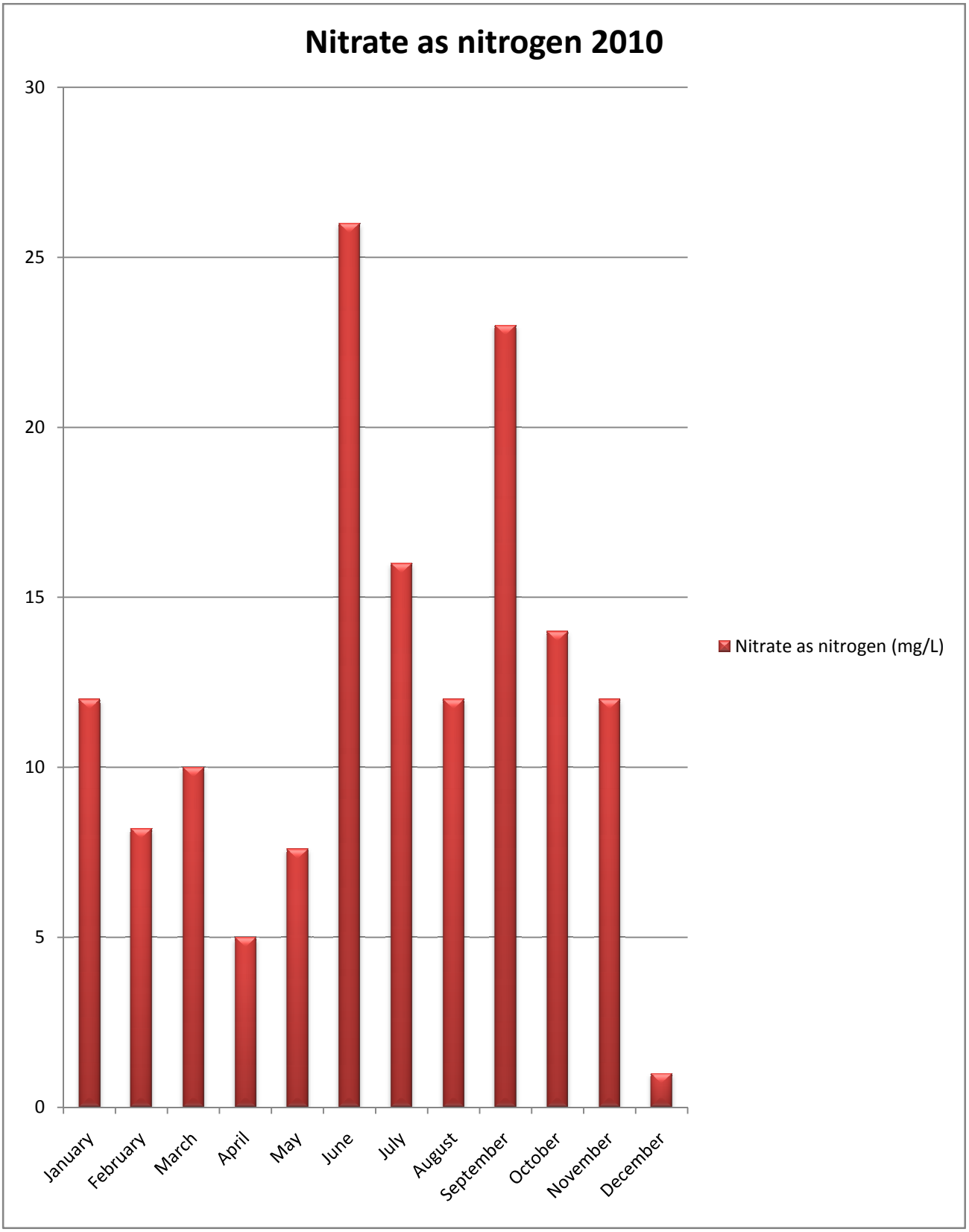

Unionized Ammonia Nitrogen 2010
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
January
February
March
April
May
June
July
August
September
October
November
December
Unionized Ammonia Nitrogen (mg/L)

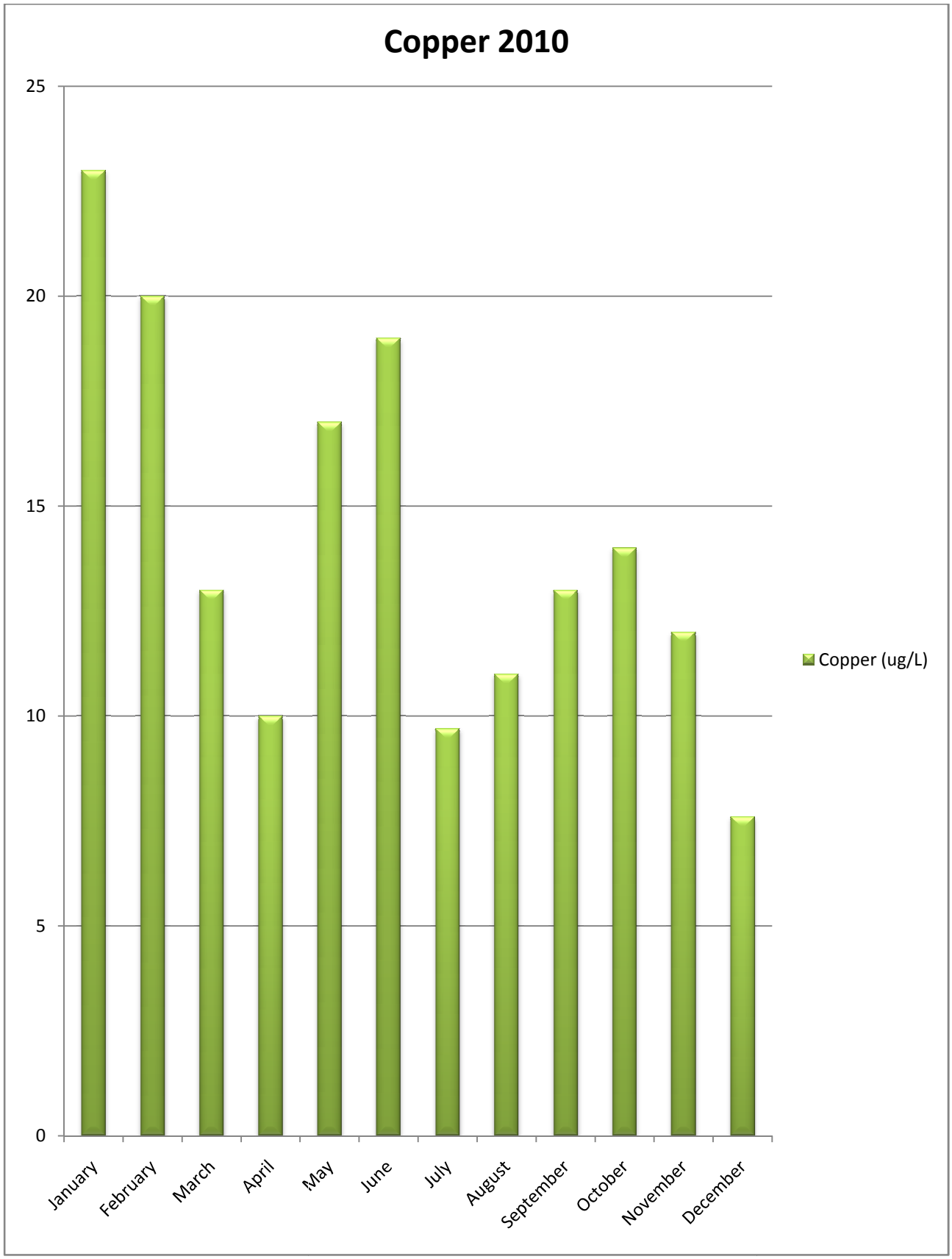

Dibromochloromethane 2010
1.4
1.2
1
0.8
0.6
0.4
0.2
0
January
February
March
April
May
june
July
August
September
October
November
December
Dibromochloromethane (ug/L)

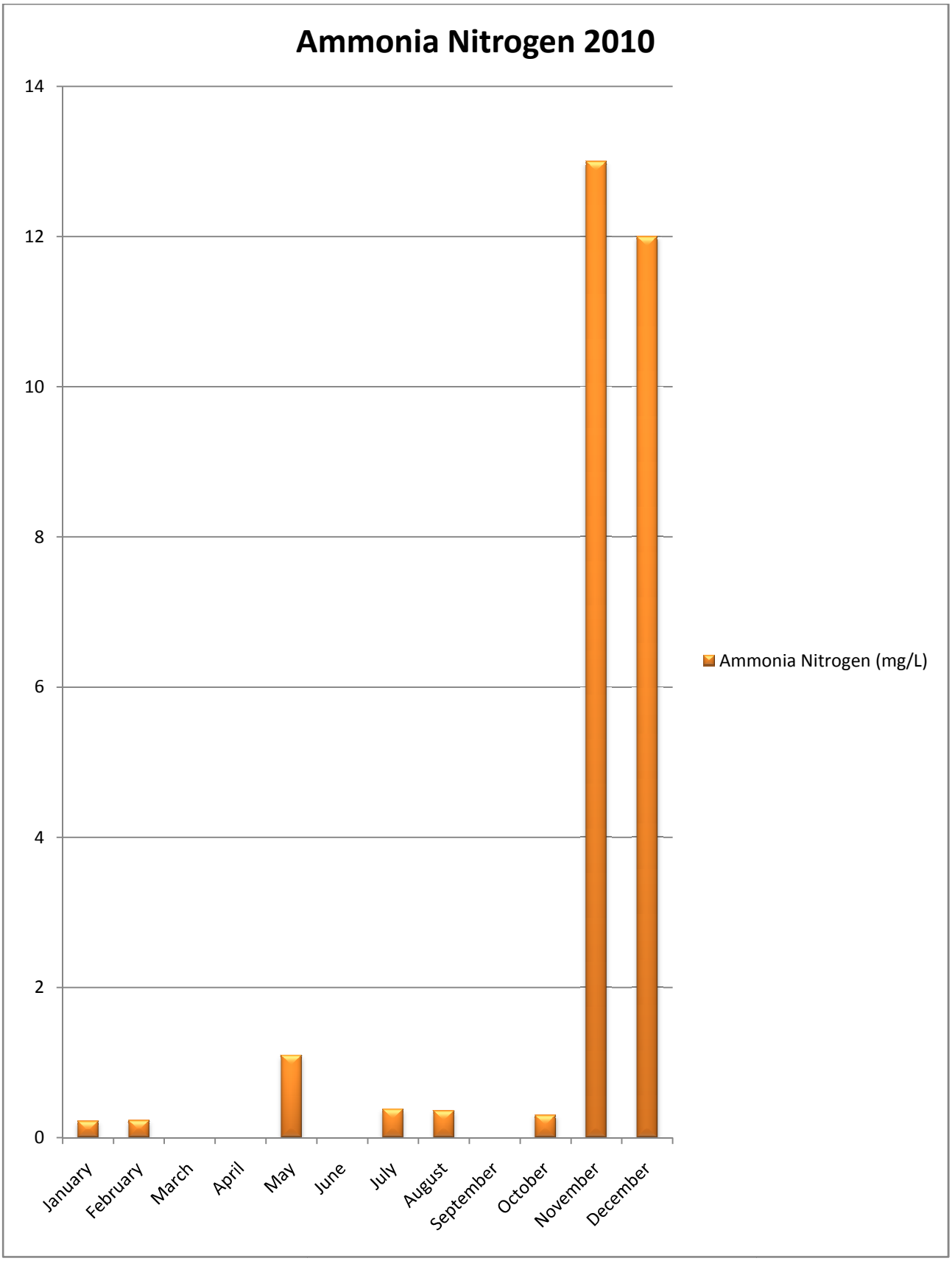

Bromodichloromethane 2010
10
9
8
7
6
5
4
3
2
1
0
January
February
March
April
May
June
July
August
September
October
November
December
Bromodichloromethane (ug/L)

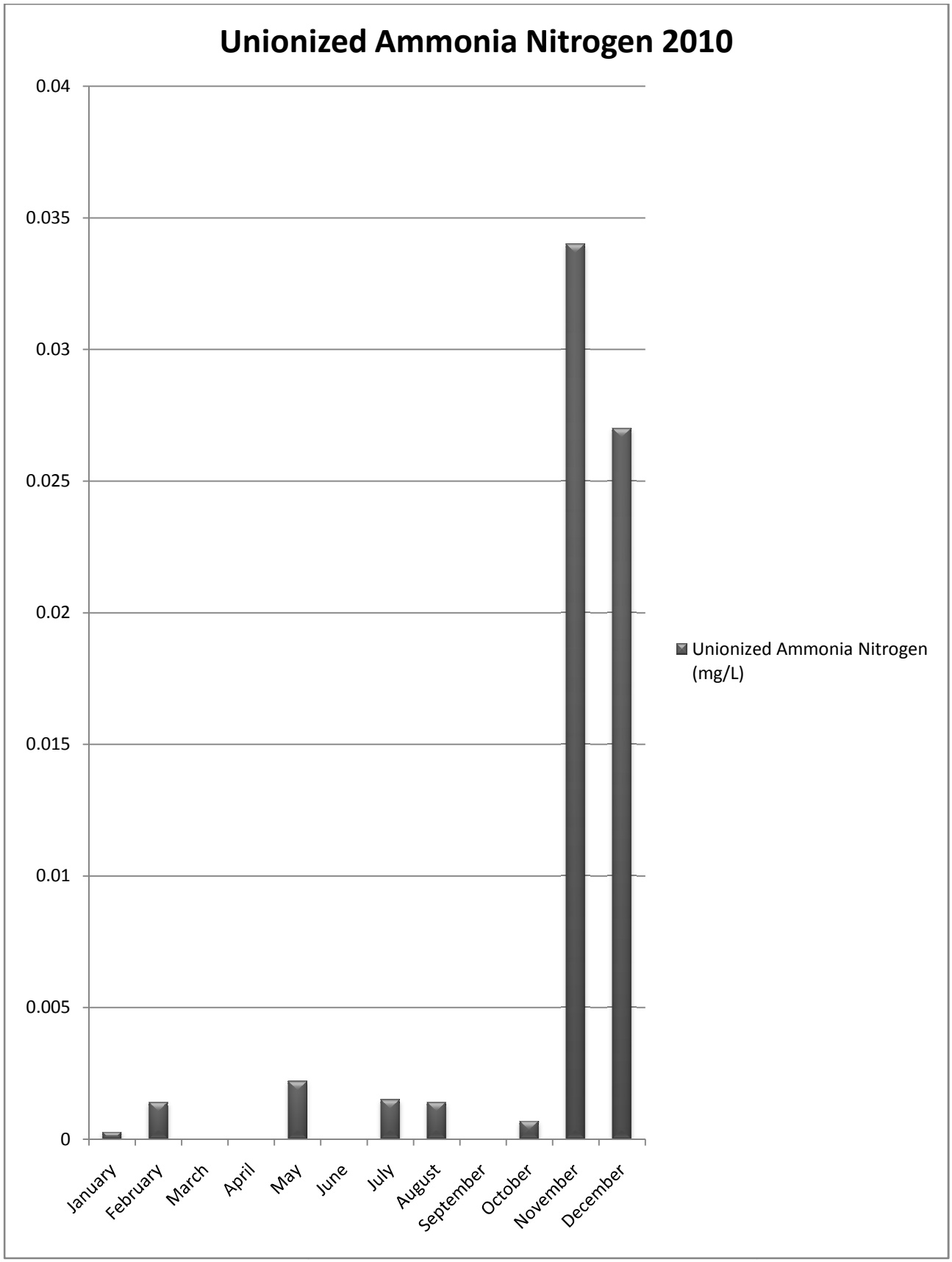

Ammonia Nitrogen 2010
14
12
10
8
6
4
2
0
January
February
March
April
May
June
July
August
September
October
November
December
Ammonia Nitrogen (mg/L)

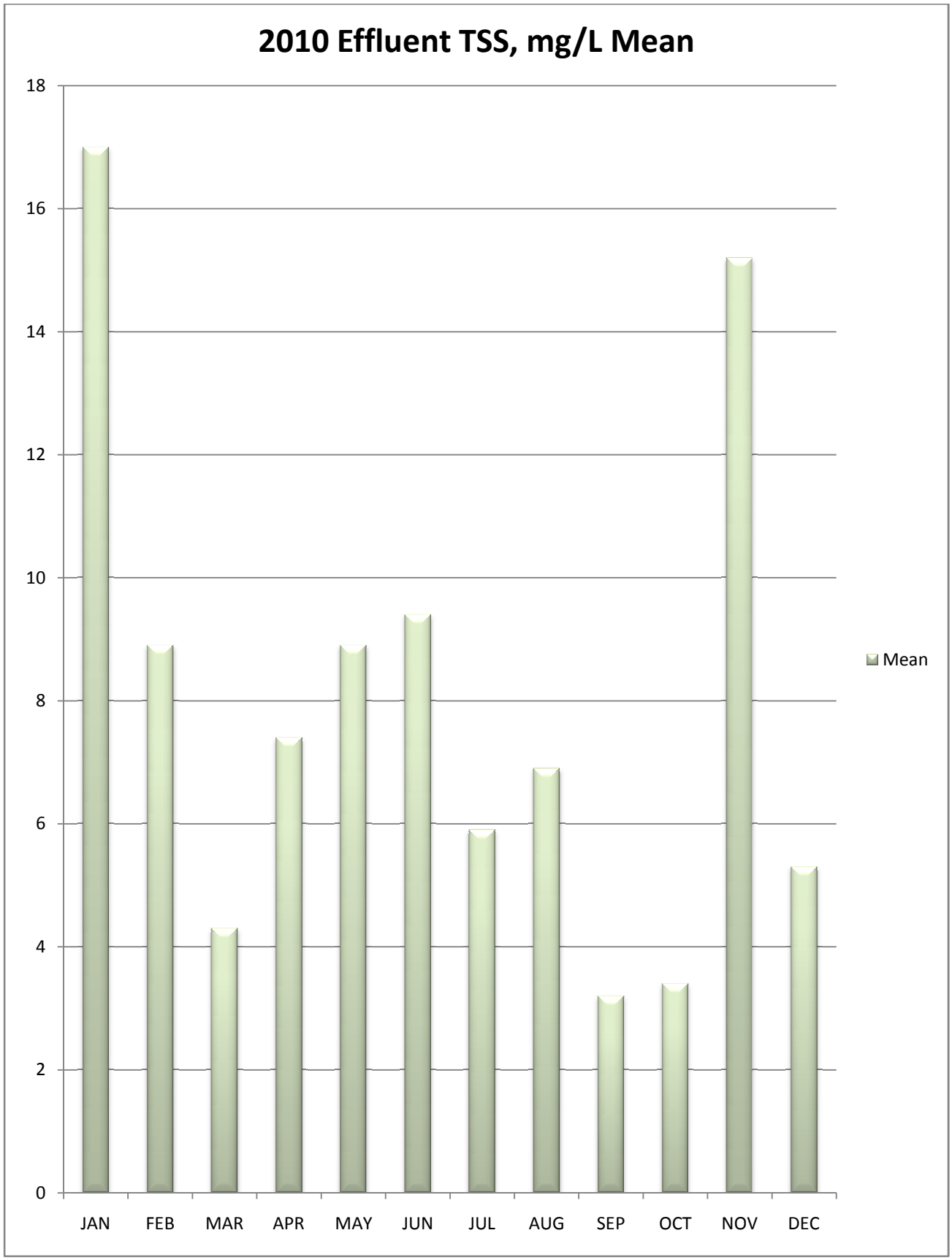

Total Phosphate Phosphourous 2010
6
5
4
3
2
1
0
January
February
March
April
May
June
July
August
September
October
November
December
Total Phosphate Phosphourous (mg/L)

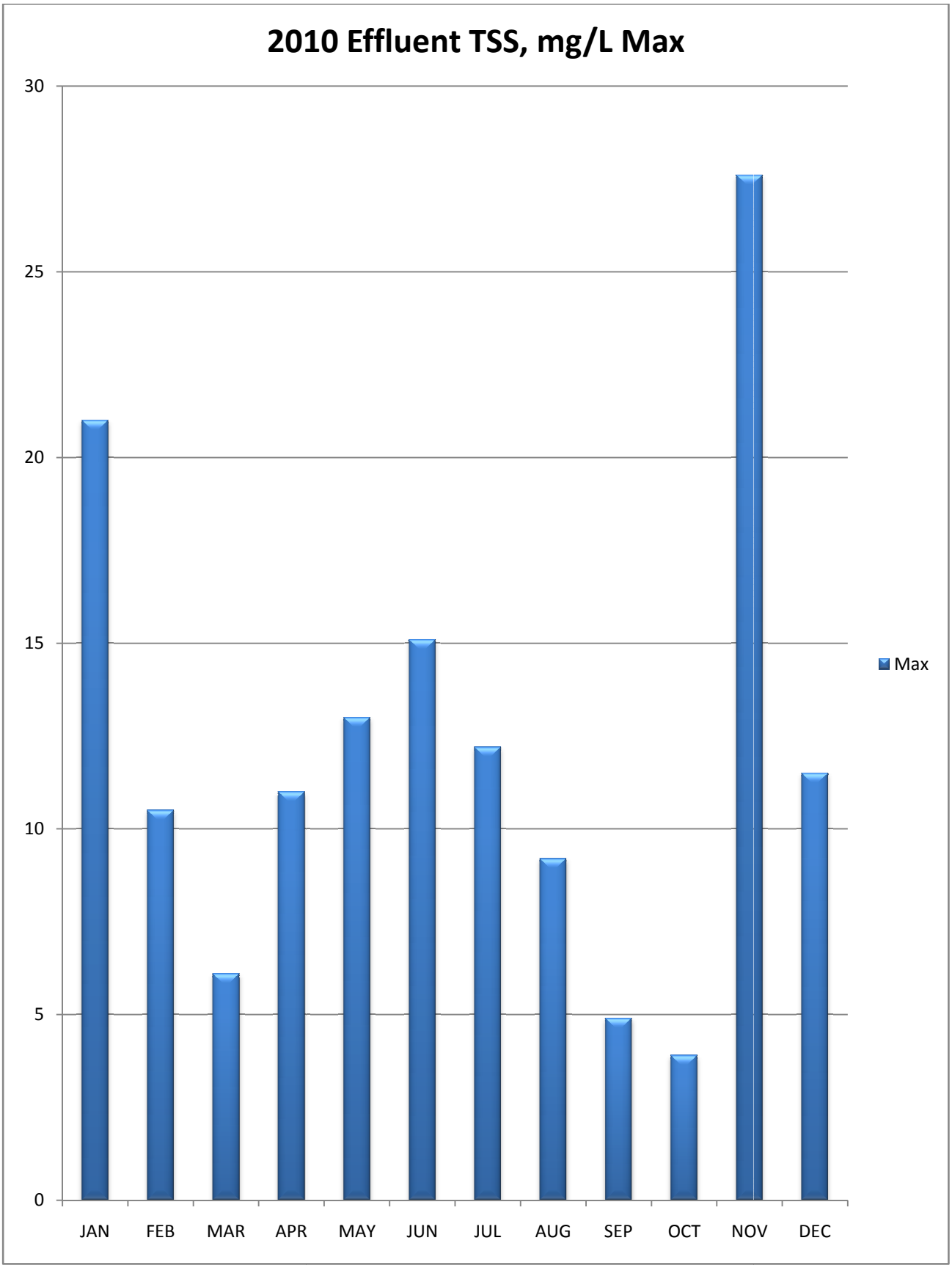

Nitrate as nitrogen 2010
30
25
20
15
10
5
0
January
February
March
April
May
June
July
August
September
October
November
December
Nitrate as nitrogen (mg/L)

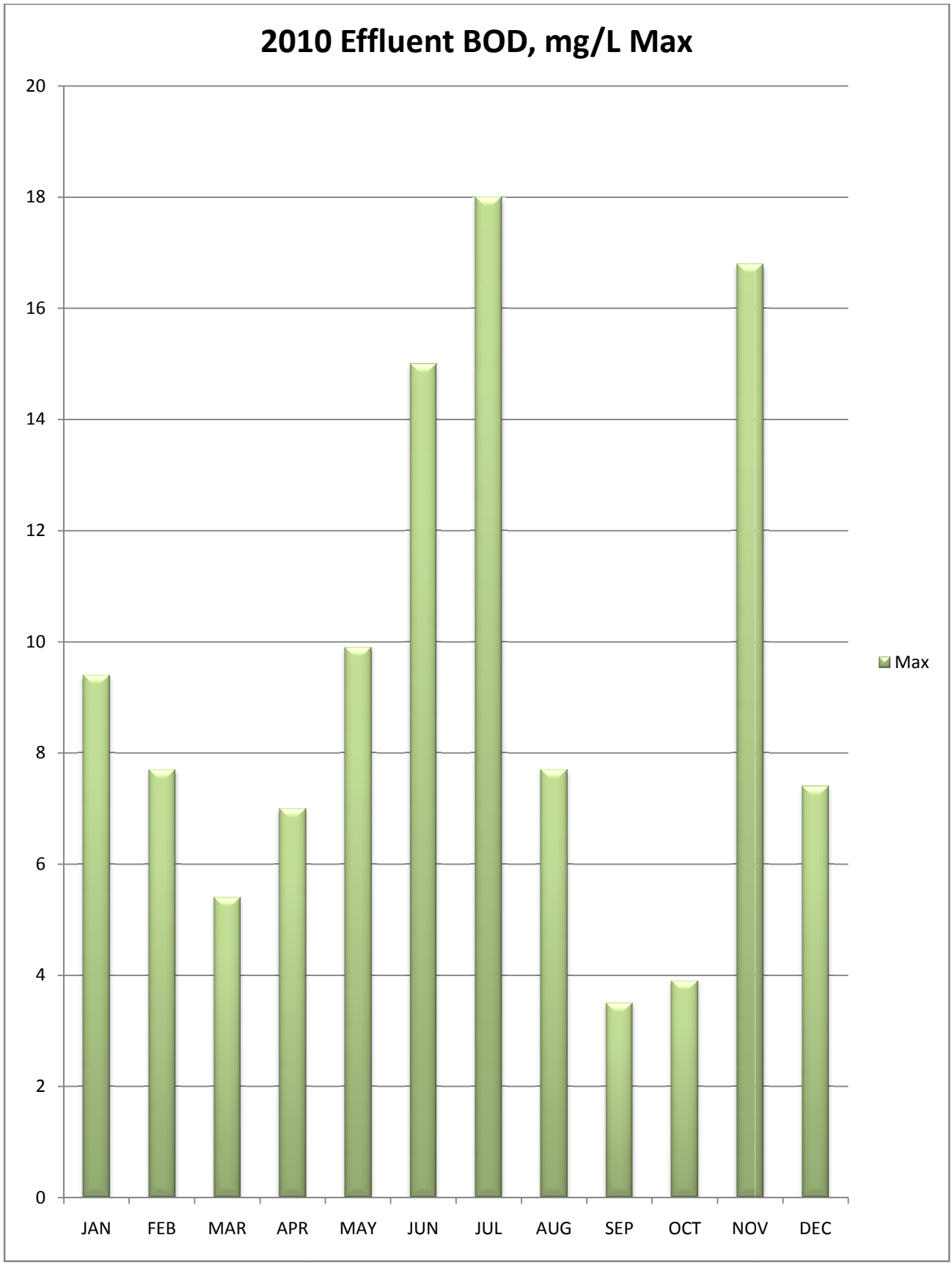

Copper 2010
25
20
15
10
5
0
January
February
March
April
May
June
July
August
September
October
November
December
Copper (ug/L)

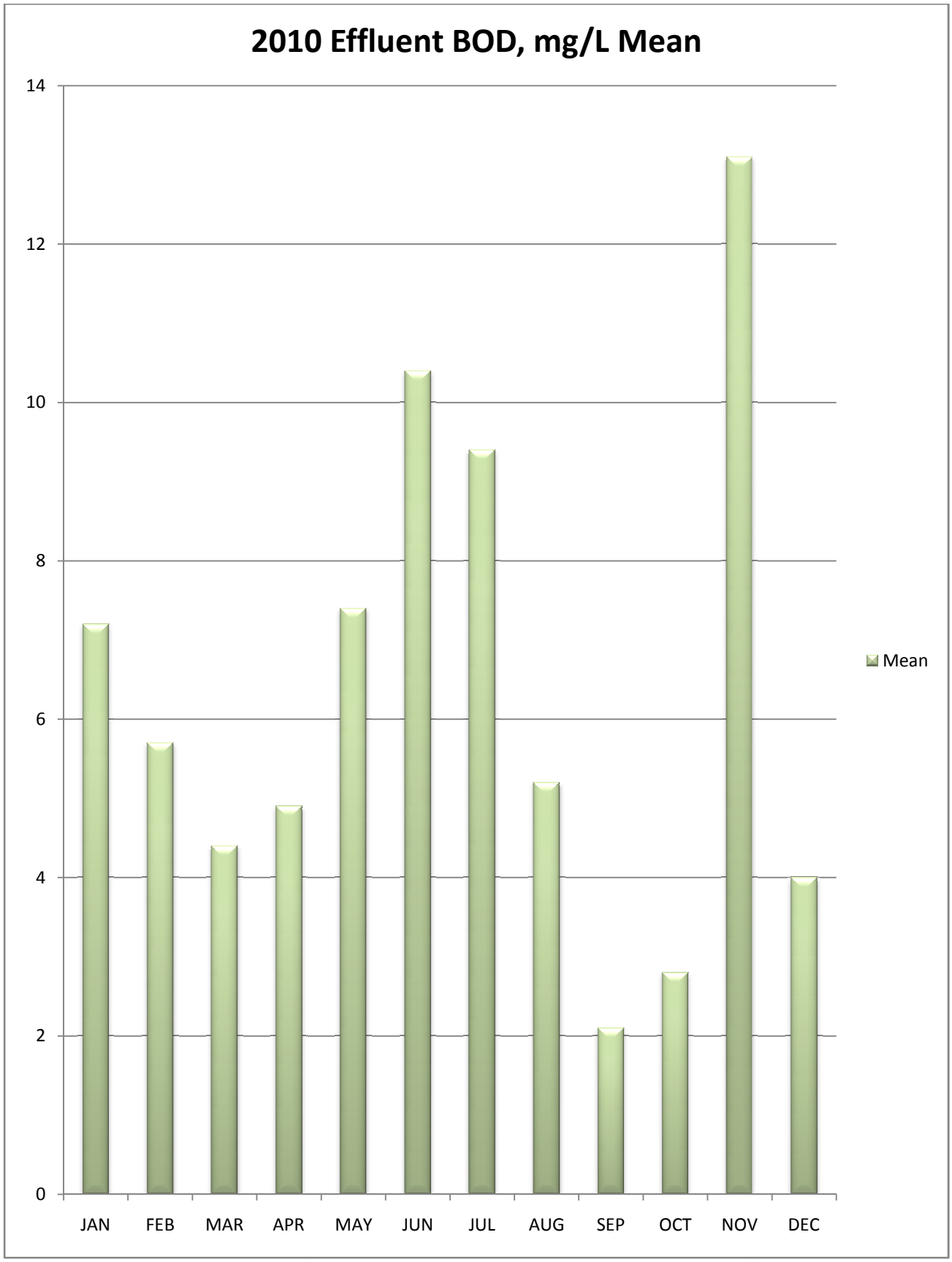

Ammonia Nitrogen 2010
14
12
10
8
6
4
2
0
January
February
March
April
May
June
July
August
September
October
November
December
Ammonia Nitrogen (mg/L)

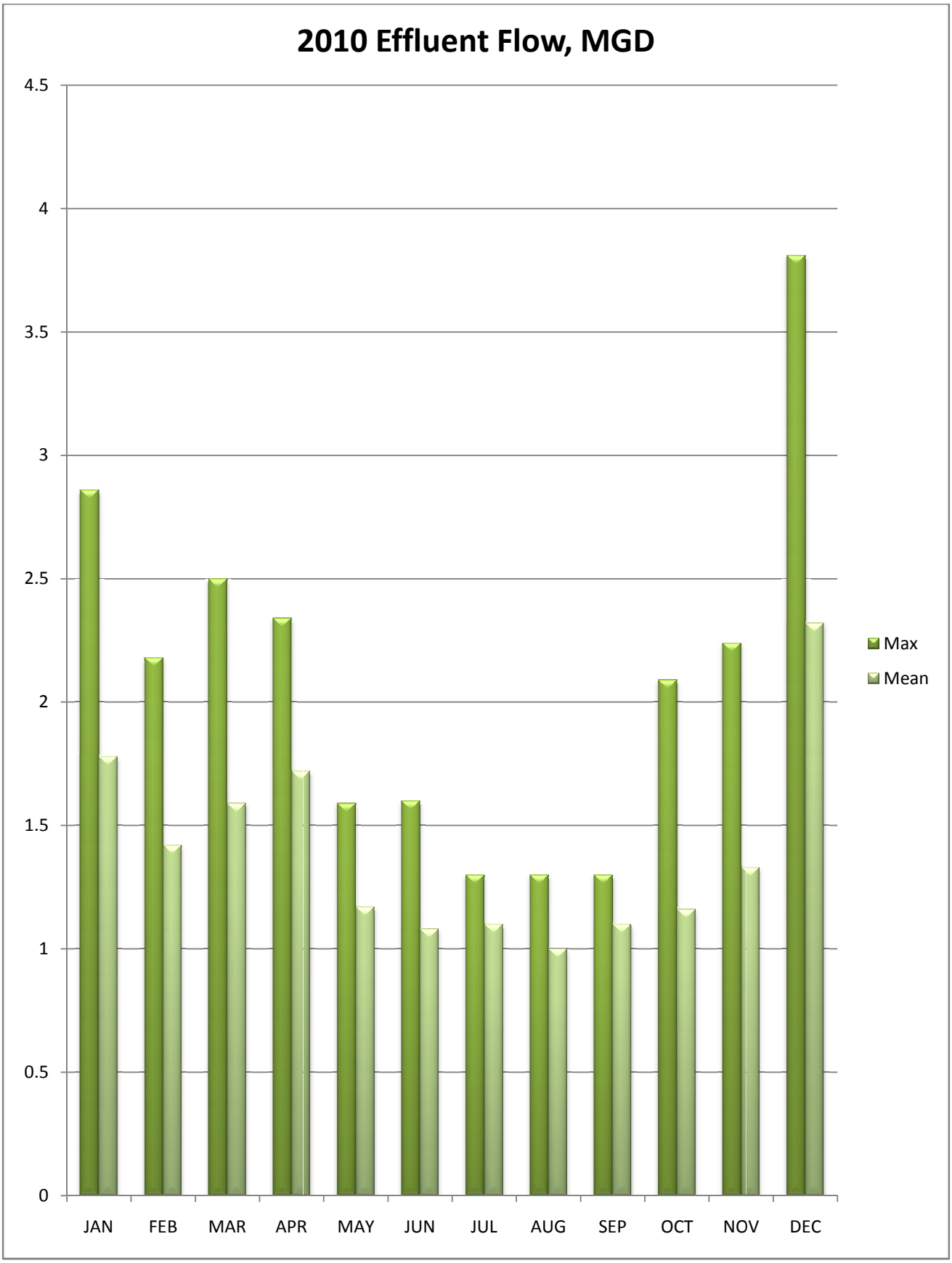

Unionized Ammonia Nitrogen 2010
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
January
February
March
April
May
June
July
August
September
October
November
December
Unionized Ammonia Nitrogen (mg/L)

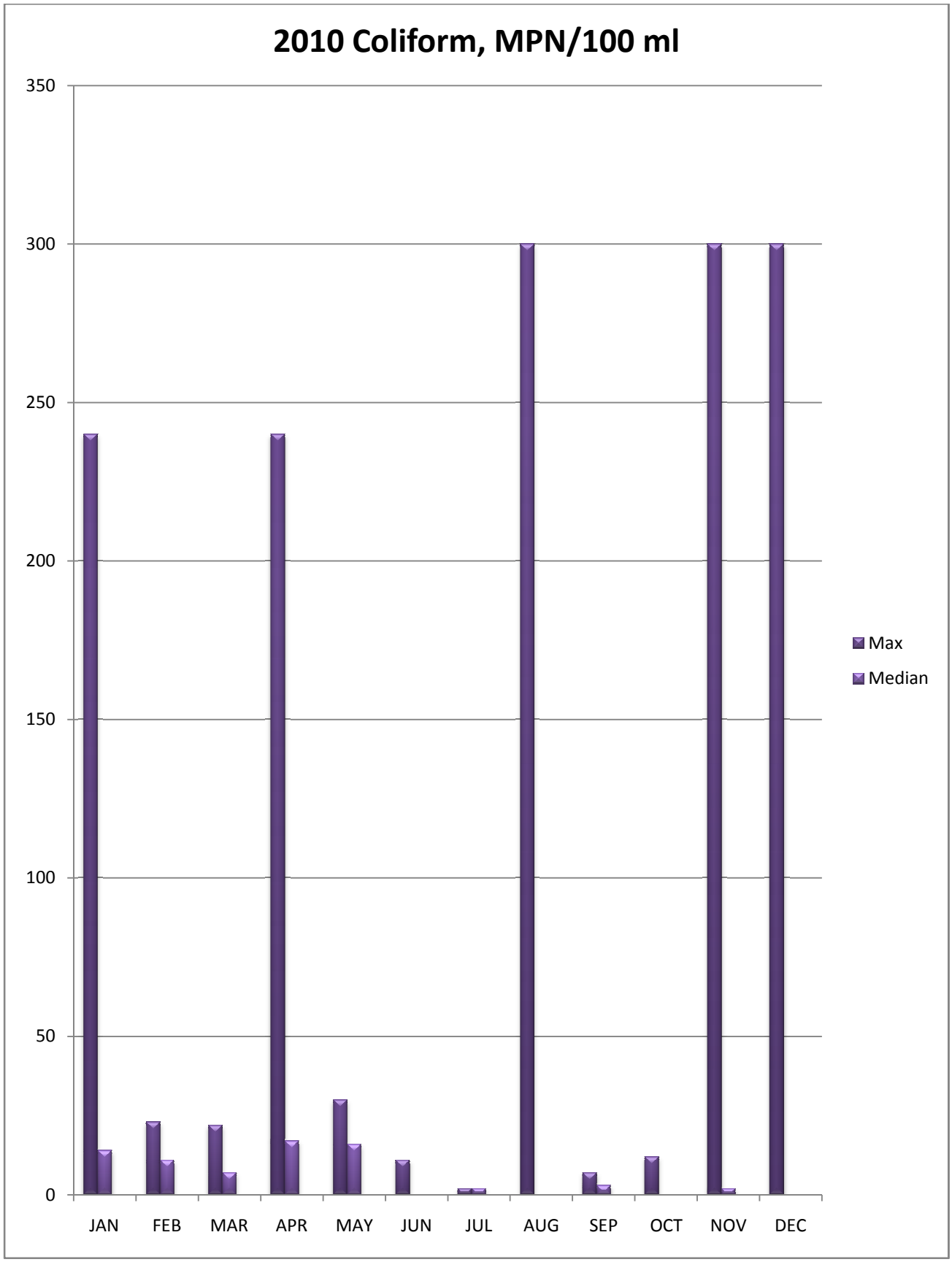

2010 Effluent TSS, mg/L Mean
18
16
14
12
10
8
6
4
2
0
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
Mean

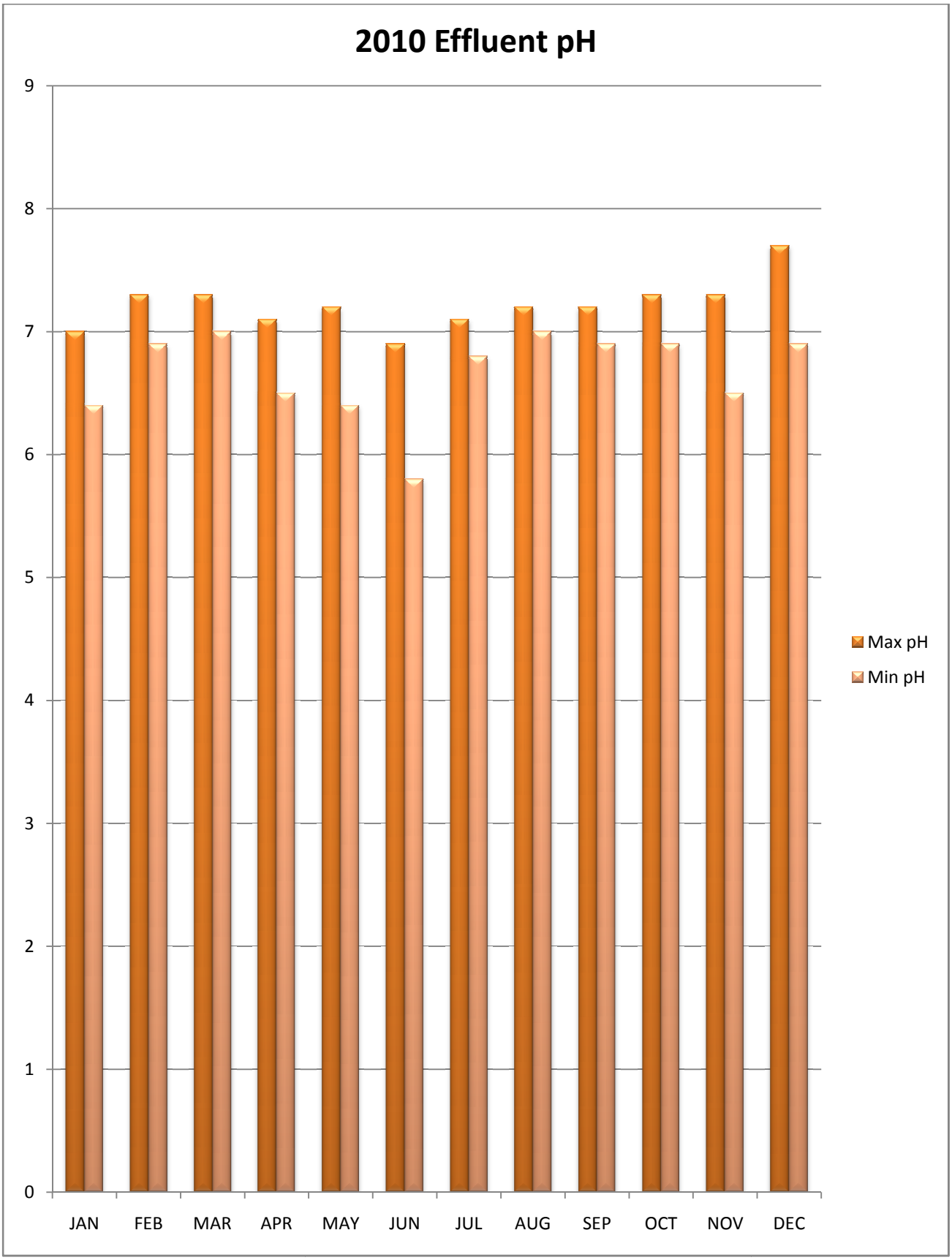

2010 Effluent TSS, mg/L Max
30
25
20
15
10
5
0
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
Max

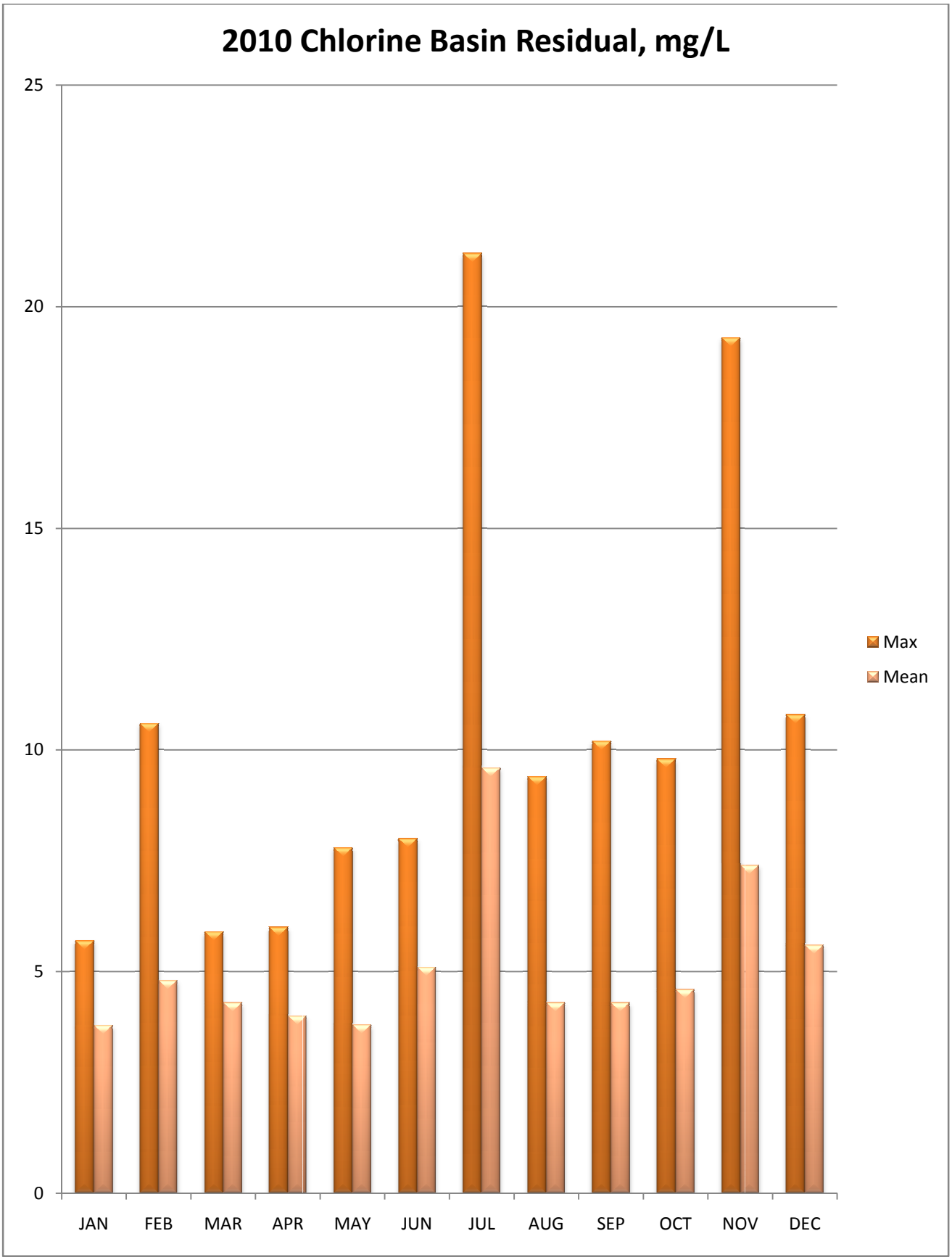

2010 Effluent BOD, mg/L Max
20
18
16
14
12
10
8
6
4
2
0
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
Max


2010 Effluent BOD, mg/L Mean
14
12
10
8
6
4
2
0
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
Mean


2010 Effluent Flow, MGD
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
Max
Mean


2010 Coliform, MPN/100 ml
350
300
250
200
150
100
50
0
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
Max
Median


2010 Effluent pH
9
8
7
6
5
4
3
2
1
0
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
Max pH
Min pH


2010 Chlorine Basin Residual, mg/L
25
20
15
10
5
0
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
Max
Mean