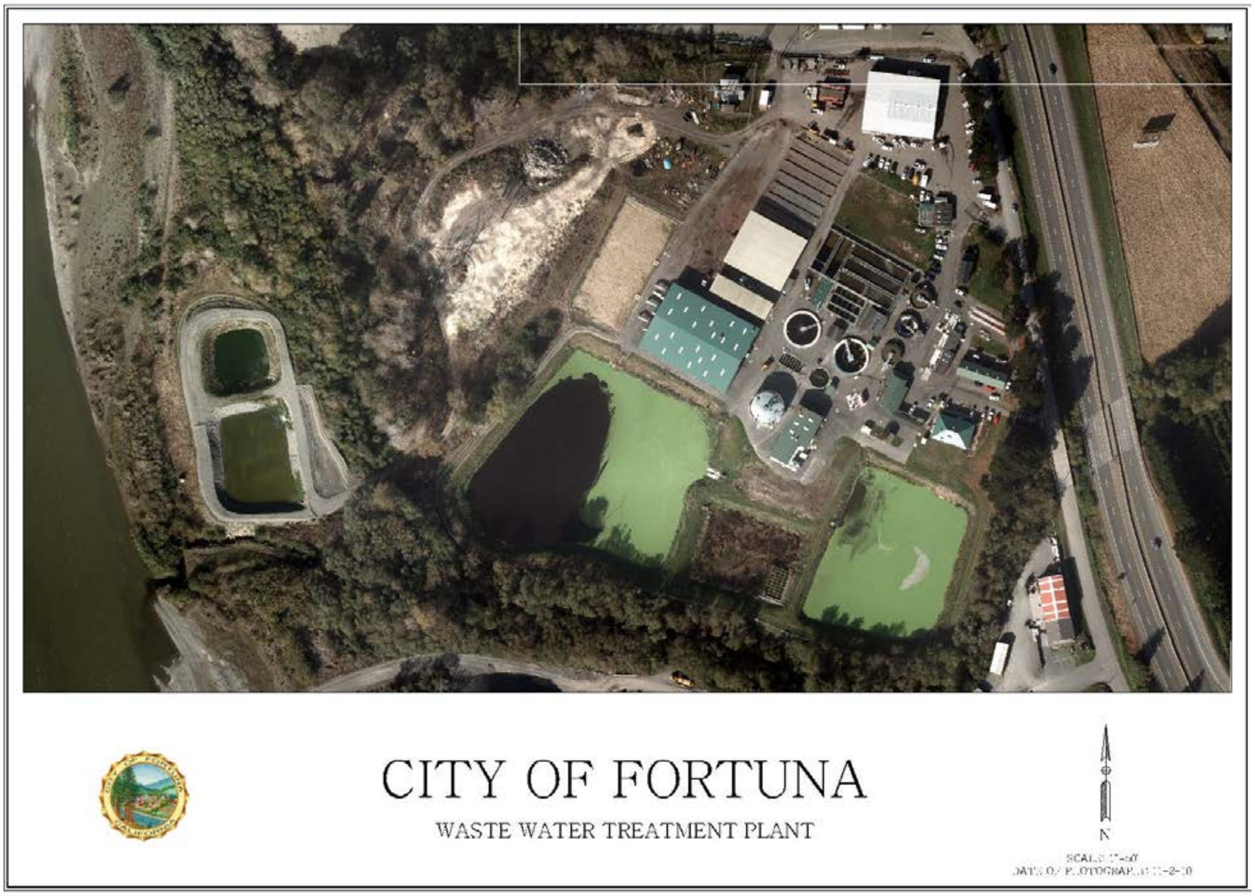
*CITY OF FORTUNA*

# TOM COOKE MEMORIAL WASTEWATER TREATMENT PLANT

*2015 ANNUAL REPORT*

January 15, 2016




## 1. Introduction

The Tom Cooke Memorial Wastewater Treatment Plant (WWTP) is operated by the City of Fortuna. The plant is located at 180 Dinsmore Drive, in Fortuna, Humboldt County, California and serves a population of approximately 12,000. Major treatment processes include screening and grit removal, primary treatment, secondary treatment, mixed liquor recycle for biological nutrient removal (BNR), sludge thickening, anaerobic digestion, electrical cogeneration, solids dewatering and composting, side stream equalization, and effluent disinfection. Treated effluent is currently discharged to the percolation ponds during dry weather, and to Strongs Creek, a tributary of the Eel River, during the wet weather season. The facility is permitted to compost biosolids to Class A Exceptional Quality standards. 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) classified the Tom Cooke Memorial Wastewater Treatment Plant as a Class III Secondary Treatment wastewater treatment facility. The facility currently operates under the SWRCB Order Number R1-2011-0004 issued on January 27, 2011. The Report of Waste Discharge has been submitted for the 2016 NPDES permit.

This report is a summary of plant operation and performance during 2015. In addition to a discussion of effluent quality and the plant's success in meeting treatment objectives, the report contains summaries of 2015 plant operations, maintenance, chemicals, utilities, and human resources.

## 2. Summary

The plant generally operated well throughout the entire year. 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 meet Disinfection Byproduct limits for discharge to Strongs Creek.

Historically, the WWTP was allowed to bypass storm flows into the oxidation ponds. Until November of 2007, the facility was permitted to discharge directly from the ponds into Strongs Creek. As such, the WWTP secondary treatment system did not have to treat the volumes that it currently treats during winter flows. Typically, peak flows through the plant prior to 2007 were 1.8 MGD. 2015 while not a typical year as far as rainfall is concerned we had our highest rainfall in February and peak high flows reached a maximum of 4.1 MGD, which is .400 MG higher than in 2014.

The City spent a great deal of time and resources in 2015 looking at alternatives for treatment processes that would allow the City to comply with the regulations anticipated in our 2016 NPDES permit. The City has also submitted a request to have year-round discharge be allowed within the North Coast Basin Plan. During the process the City's request was found favorable by the North Coast Regional Water Quality Control Board and the option made the "short list" to be considered during the Triennial review process. Since this process would take longer than a 2016 permit renewal process it was recommended by Regional Board staff that the current permit be extended with minimal modifications and the City would work toward seeing that any new changes in our treatment process would take into consideration the year-round discharge request being considered by the Region Board.

Following is a list of effluent violations and Order Condition infractions from 2015:

- On January 5th the chlorine level of 1.3 mg/L fell below the minimum of 1.5 mg/L due to clogged ammonia eductors. The eductors were cleaned and put back online. Discharge was in discharge point E-003.
- There were no violations in February, March or April
- On May 5th the Dichlorobromomethane level of 2.5 ppb exceeded the maximum limit of 1.5 ppb.
- On May 19th the chlorine level of 1.2 mg/L fell below the minimum of 1.5 mg/L due to clogged ammonia eductors. The eductors were cleaned and put back online.
- On May 20th the chlorine level of 0.9 mg/L fell below the minimum of 1.5 mg/L due to clogged ammonia eductors. The eductors were cleaned and put back online.
- On June 2nd the chlorine level of 0.8 mg/L fell below the minimum of 1.5 mg/L due to clogged ammonia eductors. The eductors were cleaned and put back online
- On July 1st the chlorine level of 1.1 mg/L fell below the minimum of 1.5 mg/L due to clogged ammonia eductors. The eductors were cleaned and put back online
- On July 9th the chlorine level of 1.4 mg/L fell below the minimum of 1.5 mg/L due to clogged ammonia eductors. The eductors were cleaned and put back online
- On August 6th the chlorine level of 1.2 mg/L fell below the minimum of 1.5 mg/L due to clogged ammonia eductors. The eductors were cleaned and put back online

- On August 7th the chlorine level of 1.0 mg/L fell below the minimum of 1.5 mg/L due to clogged ammonia eductors. The eductors were cleaned and put back online.
- On August 8th the chlorine level of 1.4 mg/L fell below the minimum of 1.5 mg/L due to clogged ammonia eductors. The eductors were cleaned and put back online.
- On August 10th the chlorine level of 1.2 mg/L fell below the minimum of 1.5 mg/L due to clogged ammonia eductors. The eductors were cleaned and put back online.
- On August 11th the chlorine level of 0.9 mg/L fell below the minimum of 1.5 mg/L due to clogged ammonia eductors. The eductors were cleaned and put back online.
- On September 2nd the chlorine level of 0.8 mg/L fell below the minimum of 1.5 mg/L due to clogged ammonia eductors. The eductors were cleaned and put back online.
- On September 14th the chlorine level of 1.0 mg/L fell below the minimum of 1.5 mg/L due to clogged ammonia eductors. The eductors were cleaned and put back online.
- On October 26th the chlorine level of 1.3 fell below the minimum of 1.5 mg/l due to clogged ammonia eductors. The ammonia educators were cleaned and put back online.
- No violations in November or December.

As noted above, most of the violations were the result of low chlorine residual in the chlorine contact basin due to clogged ammonia eductors. Staff struggled with this issue for most of the year and much time was spent trouble shooting the problem. While the issue isn't completely resolved, staff feels that the changes we have made should minimize these violations in the future. Staff found that low flows had the most effect on the mixing of the chlorine and ammonia and happened mostly at night when the flows dropped off considerably which would not allow the push water from the pneumatic tank to interact with the mixing process and the water would settle out and residuals would drop before it reached the effluent. Another cause was found to be the use of potable, chlorinated water in the mixing process. This would add chlorine residual that would not be neutralized completely by the Dechlorination process. We switched the process over to utilize process water and that helped but this change also cause acute issues with buildup in the tank when suspended solids content in the process water increased. These issues were mitigated by giving the tank a good scour as well as changing the set points on the tank's fill system to accommodate the low flows. Additional operations staff manually cleans the eductors weekly to ensure clear passage of the chemicals.

## 3. OPERATIONS

### *a. Pretreatment*

In 2015 the City of Fortuna, with the assistance of Freshwater Environmental Services, continued implementing the Fats, Oils and Grease (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. This work was conducted under the authority of the current Fortuna Municipal Code which 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. Violations are documented and proof of corrective actions is required. There were no major violations and business owners were educated on BMPs for FOG containment.

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. Routine maintenance and video was done on the City's collection system.

### *b. Influent Treatment and Quality*

The plant operates at an average dry weather flow of .760 Million Gallons per Day (MGD), and during wet weather can experience flows above 4.5 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 wet weather operational capacity of 3.8 MGD.

A summary of annual flow and influent parameter concentrations for the past three years is shown in Table 1.

**Table 1: Influent Parameters**

| | 2013 | 2014 | 2015 |
|---|---|---|---|
| Mean Influent Flow, MGD | **0.869** | **.939** | **.960** |
| Total Annual Flow, MG | **316.5** | **343.6** | **348.9** |
| Mean Influent SS, mg/L | **303** | **347** | **313** |
| Mean Influent $BOD_5$, mg/L | **337** | **335** | **319** |

### *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 head works 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, which was replaced in 2015, and returned to the plan influent wet well. The grit and screenings are collected and hauled to a sanitary landfill site.

### *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 either to the anaerobic digester or the Gravity Belt sludge thickener. There are three circular primary clarifiers. By varying the number of units online, staff implemented a control strategy to optimize secondary treatment and provide additional carbon material to effect nutrient removal. The viability of utilizing primary sludge elutriation, rinsing carbon rich volatile acids out and back into the secondary system via the gravity belt thickener, hinges on the ability to perform this process without undue odor formation.

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

**Table 2: Primary Treatment Effluent Parameters**

| | 2013 | 2014 | 2015 |
|---|---|---|---|
| Mean Primary Effluent TSS, mg/L | **75** | **88** | **82** |
| Mean Primary Effluent $BOD_5$, mg/L | **206.8** | **195.6** | **179** |

### *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 flows to three parallel aeration basins where it is mixed with Return Activated Sludge (RAS) from final clarifiers and is aerated. As in the case of 2014, due to the low rainfall in 2015 only two of the basins were online for most of the year. 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.

A mixed liquor recycle system allows denitrification for removal of Nitrate Nitrogen from the waste stream. This process improves the secondary treatment process by returning a portion of the alkalinity removed during the nitrification process and reducing the need for caustic soda addition. At present, the process continues to require some caustic soda addition due to the inadequate supply of carbon which is necessary for anoxic conversion of Nitrate into Nitrogen gas.

The mixed liquor from the aeration basins flows to large 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 two final clarifiers, and the number in operation is adjusted to optimize performance during varying flow conditions. Flows indicative of low rainfall has allowed the operation of only one secondary clarifier for the entire year.

Operations staff has an ongoing Biological Nutrient Removal project we've been working on in 2015. The objective is to incubate, enrich and grow anammox bacteria for the use in treating high level ammonia from digester dewatering operations. The benefits of anammox treatment vs. conventional treatment include:

- Savings of up to 60% on energy used in aeration
- Savings of up to 100% of carbon requirement
- No additional alkalinity requirements
- Lower sludge yield
- Lower greenhouse gas emissions

The challenge is to create conditions that favor the growth of slow growing anammox bacteria (11 day doubling rate) over the faster growing aerobic ammonia oxidizing bacteria (AOBs- 7 hour doubling rate) and nitrite oxidizing bacteria (NOBs-11 hour doubling rate). This is achieved through manipulation of feed and wasting rates, Dissolved Oxygen, pH and Temperature.

The Ongoing Plan is to **c**ontinue tightening controls on pretreatment with the SHARON (**S**ingle reactor system for **H**igh activity **A**mmonium **R**emoval **O**ver **N**itrite) reactor and anammox reactor processes to maintain stability and predictability, then move to progressively increasing ammonia feed concentration as conditions warrant.

The results of the project have shown that Nitrogen from our digester dewatering process contributes up to 15% to 20% of nitrogen load to the plant. Removal of this nitrogen by anammox has potential annual savings to the city of $20,000 to $50,000 over conventional treatment.

Additionally, should the city elect at some point to contract with a deammonification water technology vendor, having our own developed anammox sludge would give us leverage over their tight restrictions.

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

**Table 3: Secondary Treatment Process Parameters**

| | *2013* | *2014* | *2015* |
|---|---|---|---|
| Mean Mixed Liquor Suspended Solids, mg/L | **2860** | **1464** | **1575** |
| Mean F:M Ratio | **0.17** | **.25** | **.21** |
| Mean Cell Residence Time, days | **30** | **14** | **14** |

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

Chlorine gas is combined with ammonia to form chloramines which are used to disinfect the final effluent before it is discharged. 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 and Dissolved Oxygen. In 2015, the plant continued to produce a high quality effluent. A summary of key final effluent parameters for 2015 is shown in Table 4. Details of the final effluent qualities are presented in graphical form in Appendix A. A summary of other key treatment parameters for 2015 is shown in Table 5.

**Table 4: Treated Wastewater Parameters 2015**

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ammonia Nitrogen (mg/L) | 1.1 | 2.7 | 1.9 | 1.1 | 0.51 | 0.78 | 0.26 | 1.9 | 1.8 | 0.54 | 2.6 | 1 |
| Unionized Ammonia Nitrogen (mg/L) | 0.0016 | 0.0027 | 0.0056 | 0.0013 | 0.00088 | 0.0012 | 0.00074 | 0.0035 | 0.0053 | 0.0012 | 0.0047 | 0.001 |
| Nitrate as nitrogen (mg/L) | 17 | 12 | 24 | 13 | 33 | 27 | 32 | 25 | 29 | 33 | 29 | 26 |
| Total Phosphate Phosphorous (mg/L) | 3 | 2.1 | 3.8 | 2 | 5 | 5.5 | 5.3 | 5.5 | 5.1 | 5.4 | 5.4 | 4.1 |
| Copper (ug/L) | 8.1 | 11 | 8.5 | 6.9 | 15 | 15 | 11 | 12 | 10 | 8.8 | 14 | 7 |
| Bromodichloromethane (ug/L) | ND | ND | ND | ND | 2.5 | 1.2 | 1.3 | ND | ND | 1.9 | ND | 1.1 |
| Dibromochloromethane (ug/L) | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Nitrate, lbs/day average | 161 | 191 | 204 | 127 | 240 | 182 | 218 | 177 | 228 | 205 | 201 | 478 |

# Table 5: Key Treatment Parameters 2015

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EFFLUENT BOD, mg/L | | | | | | | | | | | | |
| Max | 18.6 | 3.8 | 8.1 | 8.1 | 6.4 | 10.8 | 7 | 7 | 6.6 | 8.3 | 14.4 | 7.5 |
| Mean | 10.1 | 2.8 | 6.1 | 3.9 | 4.8 | 6 | 4.6 | 5.4 | 5.1 | 5.7 | 9 | 6.1 |
| Average lbs/day | 95.7 | 44.6 | 51.7 | 38.1 | 35 | 40 | 31 | 38 | 35 | 40 | 74.1 | 112.3 |
| INFLUENT BOD, mg/L | | | | | | | | | | | | |
| Max | 361 | 277 | 310 | 352 | 425 | 400 | 386 | 530 | 460 | 419 | 352 | 488 |
| Mean | 275 | 218 | 286 | 270 | 319 | 346 | 343 | 439 | 373 | 349 | 298 | 309.3 |
| Average lbs/day | 2280 | 2884 | 2175 | 2387 | 2062 | 2046 | 1977 | 2907 | 2137 | 2005 | 2065 | 4898 |

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INFLUENT TSS, mg/L | | | | | | | | | | | | |
| Max | 375 | 375 | 344 | 352 | 411 | 465 | 447 | 527 | 447 | 285 | 322 | 55 |
| Mean | 251 | 237 | 290 | 300 | 357 | 358 | 376 | 420 | 331 | 254 | 278 | 302 |
| Average lbs/day | 2092 | 3135 | 2206 | 2652 | 2307 | 2117 | 2167 | 2781 | 1896 | 1460 | 1926 | 4789 |
| EFFLUENT TSS, mg/L | | | | | | | | | | | | |
| Max | 33.2 | 6 | 13.1 | 6 | 16.9 | 16.9 | 5.3 | 6.6 | 9.3 | 10.6 | 9.9 | 7.7 |
| Mean | 12.2 | 2.7 | 6.5 | 3.2 | 6.1 | 6 | 4 | 4.7 | 5.1 | 6.3 | 8.8 | 5.1 |
| Average lbs/day | 116 | 43 | 55 | 31 | 44 | 40 | 27 | 33 | 35 | 46 | 72.5 | 93.9 |
| INFLUENT FLOW, MGD | | | | | | | | | | | | |
| Max | 1.265 | 3.443 | 1.365 | 2.251 | 1.473 | 0.81 | 0.761 | 0.794 | 0.807 | 0.814 | 1.316 | 3.556 |
| Mean | 0.994 | 1.586 | 0.912 | 1.06 | 0.775 | 0.709 | 0.691 | 0.697 | 0.687 | 0.689 | 0.831 | 1.899 |
| TOTAL | 30.82 | 44.401 | 28.262 | 31.787 | 24.04 | 21.263 | 21.41 | 21.603 | 20.595 | 21.355 | 24.942 | 58.446 |
| EFFLUENT FLOW, MGD | | | | | | | | | | | | |
| Max | 1.136 | 1.912 | 1.02 | 1.171 | 0.874 | 0.808 | 0.818 | 0.848 | 0.827 | 0.848 | 0.988 | 2.207 |
| Mean | 1.566 | 4.153 | 1.554 | 2.462 | 1.143 | 0.999 | 0.947 | 1.000 | 0.969 | 1.009 | 1.567 | 3.847 |
| TOTAL | 35.22 | 53.53 | 31.62 | 35.138 | 27.1 | 24.227 | 25.349 | 26.281 | 24.803 | 26.291 | 29.627 | 67.984 |

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SETTLEABLE SOLIDS, ml/L | | | | | | | | | | | | |
| Max | N/A | <0.1 | 0.2 | 0.1 | <0.1 | N/A | N/A | N/A | N/A | N/A | N/A | <0.1 |
| Mean | N/A | <0.1 | 0.1 | <0.1 | <0.1 | N/A | N/A | N/A | N/A | N/A | N/A | <0.1 |
| COLIFORM, MPN | | | | | | | | | | | | |
| Median | 7.5 | 1.9 | 2 | 1.8 | 8.3 | 1.8 | 35 | 1.9 | 1.8 | <1.8 | 3.2 | 1.9 |
| Max | 350 | 4.5 | 4.5 | 46 | 49 | 4 | 170 | 17 | 2 | <1.8 | 33 | 2 |
| PH | | | | | | | | | | | | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Max pH | 6.7 | 6.8 | 7.2 | 6.8 | 6.7 | 6.8 | 6.7 | 6.7 | 6.9 | 6.8 | 6.9 | 6.3 |
| Min pH | 6.3 | 6.5 | 6.7 | 6.6 | 6.6 | 6.6 | 6.7 | 6.5 | 6.7 | 6.8 | 6.7 | 7.2 |
| BASIN CHLORINE RESIDUAL, mg/L | | | | | | | | | | | | |
| Mean | 3.1 | 3.3 | 3.1 | 3.5 | 3.3 | 2.8 | 2.6 | 4.1 | 4 | 4.3 | 3.5 | 3.3 |
| Max | 6.7 | 4.7 | 5.5 | 6.4 | 6.3 | 5.4 | 4.8 | 9.5 | 7.8 | 8.1 | 5.6 | 4.8 |
| Mixed Liquor Concentration, mg/L | | | | | | | | | | | | |
| Max | 1350 | 1618 | 1393 | 1697 | 1406 | 1463 | 1573 | 2295 | 1635 | 1512 | 1466 | 1493 |
| Mean | 1663 | 1824 | 1575 | 1927 | 1688 | 1973 | 1766 | 3741 | 1867 | 1619 | 1617 | 1739 |
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
| Sludge Wasted, LBS | | | | | | | | | | | | |
| Max | 30000 | 48000 | 36,000 | 46000 | 47000 | 36780 | 37000 | 39000 | 34000 | 34250 | 40000 | 43000 |
| Mean | 24000 | 33000 | 31,500 | 40000 | 40000 | 29947 | 31564 | 30991 | 29000 | 30000 | 29000 | 37000 |
| TOTAL(1000 lbs) | 17.4 | 29.2 | 25.7 | 36.7 | 31.9 | 21.0 | 21.8 | 32.7 | 23.0 | 22.9 | 20.4 | 28.2 |
| Primary Sludge Digested, LBS | 34911 | 39534 | 34503 | 38861 | 49678 | 43063 | 46804 | 43435 | 38230 | 37654 | 39823 | 43301 |
| Primary Sludge % solid | 2.6 | 2.3 | 2.1 | 2.2 | 2.6 | 2.2 | 2.3 | 2.1 | 2.3 | 2.3 | 2.5 | 2.2 |
| Cogeneration, kwh | 15.5 | 0 | 16.75 | 35.75 | 18.75 | 0 | 1 | 1 | 37.25 | 37.75 | 94.25 | 48.5 |
| Mean Primary Effluent BOD, mg/L | 153 | 136 | 173 | 143 | 178 | 202 | 199 | 229 | 217 | 214 | 183 | 125 |
| Mean Primary Effluent TSS, mg/L | 80 | 67 | 92 | 66 | 86 | 91 | 82 | 98 | 89 | 86 | 84 | 67 |

### g. *Solids Handling*

The anaerobic digestion process reduces sludge volume and stabilizes the solids to form biosolids. In 2015, an average of 1355 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 2.3% and total volatile solids content was 88% 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 2015, approximately 853 lb/day of WAS was thickened and sent to the digester. In 2015, approximately 128 dry metric tons of biosolids were produced. We produced approximately 446 dry metric tons of Class A Exceptional Quality compost of which 166 DMT were given away to the public. Biosolids 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 2015 are presented in Table 6. We did meet the 40-503 standards for fecal coliform and salmonella which is what is required for Class A compost. We only tested two lots of compost which was during the 1st and 3rd quarters of 2015.

**Table 6: Biosolids Quality Monitoring 2015**

Compost monitoring in 2015, mg/kg

| | 1st Quarter | 2nd Quarter | 3rd Quarter | 4th Quarter |
|---|---|---|---|---|
| Arsenic (As) | 2.9 | NA | 3.4 | NA |
| Cadmium (Cd) | 1.3 | NA | 1.6 | NA |

| | | | | |
|---|---|---|---|---|
| Chromium (Cr) | 27 | NA | 38 | NA |
| Copper (Cu) | 190 | NA | 180 | NA |
| Lead(Pb) | 24 | NA | 32* | NA |
| Mercury (Hg) | 0.39 | NA | 0.35 | NA |
| Molybdenum (Mo) | 2.7 | NA | 3.7 | NA |
| Nickel (Ni) | 27 | NA | 37 | NA |
| Selenium (Se) | 3.5 | NA | ND | NA |
| Zinc (Zn) | 410 | NA | 400 | NA |

Compost monitoring in 2015

| | 1st Quarter | 2nd Quarter | 3rd Quarter | 4th Quarter |
|---|---|---|---|---|
| Salmonella, MPN/ 1 g TS | <0.4 | NA | NA | NA |
| Fecal Coliform, MPN/ 1 g TS | 2,235 | NA | 1.8 | NA |

(Manure Typically has >2,400 MPN/g TS Fecal Coliforms)

## 4. MAINTENANCE

### *a. Maintenance Summary*

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

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 notable predictive maintenance was completed in 2015:

- Replaced grit screw and wear bars on Grit Mitt System
- Rebuilt bearing intake oiler to aeration blower #2
- Replaced electrical components on Gravity Belt Thickener
- Replaced starter on Co-Gen unit
- Installed new RAS VFD and HIM controller
- Installed two new Primary pumps
- Replaced Belt Drive on Belt Filter Press
- Installed two new chlorine regulators

### *b. Flow Meter Calibration Record*

Flow to the plant is measured at the head works and chlorine contact basin effluent weir. Meters are checked monthly for accuracy and functionality.

## 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 to provide for the increased demand for alkalinity associated with nitrification for nutrient removal (i.e. ammonia) during 2015 was approximately 113.7 tons. 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 2015, approximately 15.9 tons were consumed for this purpose.

#### iii. Sulfur Dioxide for Dechlorination

Sulfur Dioxide is used for dechlorination of the final effluent prior to discharge to Strongs Creek. In 2015, approximately 13.1 tons was consumed for this purpose.

#### iv. Anhydrous Ammonia

Anhydrous Ammonia is used to eliminate free, uncombined chlorine and limit Disinfection Byproduct formation. Approximately 2.1 tons was consumed for this purpose in 2015.

### b. Utilities

#### i. Reclaimed Water

The total amount of water reclaimed from the treated effluent for use in the treatment plant averaged 109,025 gallons per day for an estimated reclaimed water usage of 39.8 million gallons in 2015.

#### ii. Cogeneration

During the year, the cogeneration unit was in operation for 591 hours at 86 kilowatts (kw). The City has signed on to programs to reduce power consumption on the grid during high peak times so we run the cogeneration unit more often in the summer high-peak months then in the winter.

## 6. HUMAN RESOURCES

### a. *Staffing*

In 2015 plant staff remained at the same number as in 2014 although certification levels increased. While the number of operators remained the same current operators have received higher level certification. For most of 2015 the plant operated the weekend shift with two operators. Late in the year, with the reduction of staff through attrition, in an effort to spread out the weekend duty we transitioned into a one-operator weekend shift. This rotation keeps operators from having to work multiple weekends during the month. Weekend job duties requiring two operators were scheduled during the week and weekend operators focus on process control tasks that keep the plant running efficiently. With the close proximity of seven of the eight operators, living within 5 miles of the facility, there is operational assistance close by if needed by the lone operator working the weekend shift. It should be noted that The WWTP was awarded *Plant of the Year* by the North Coast Chapter of the California Water Environment Association. Plant staffing for 2015 is shown in Table 7.

**Table 7: Plant Staffing**

| | |
|---|---|
| Chief Plant Operator | 1 |
| Shift Supervisor | 2 |
| WWTP Operator | 5 |
| Plant Maintenance Mechanic | 1 |
| Lab Director | 1 |

### b. *Staff Training & Development*

In addition to weekly safety meetings, the WWTP has developed an 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. The following topics were discussed during the course of the year:

- Bloodborne Pathogens
- Lab Safety
- Respiratory safety
- Confined Space
- Chemical Handling Safety

### c. *Operator Certification*

In 2015 the city employed three Grade 4 operators, two Grade 3 operators one Grade 2 operator and two Grade 1 operators. The OIT position was eliminated. The WWTP continues to have two full time Shift Supervisor positions in 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.

Table 8 summarizes the status of operator certification held by WWTP operators at the facility during 2015.

**Table 8: Wastewater Treatment Certifications**

| | |
|---|---|
| Grade IV | 3 |
| Grade III | 2 |
| Grade II | 1 |
| Grade I | 2 |

Additional certifications held by WWTP staff include Laboratory Analyst, Water Treatment, & Maintenance Technologist certifications. One staff member is qualified to perform Energized Electrical Work, as well.

## 7. Certification of Report

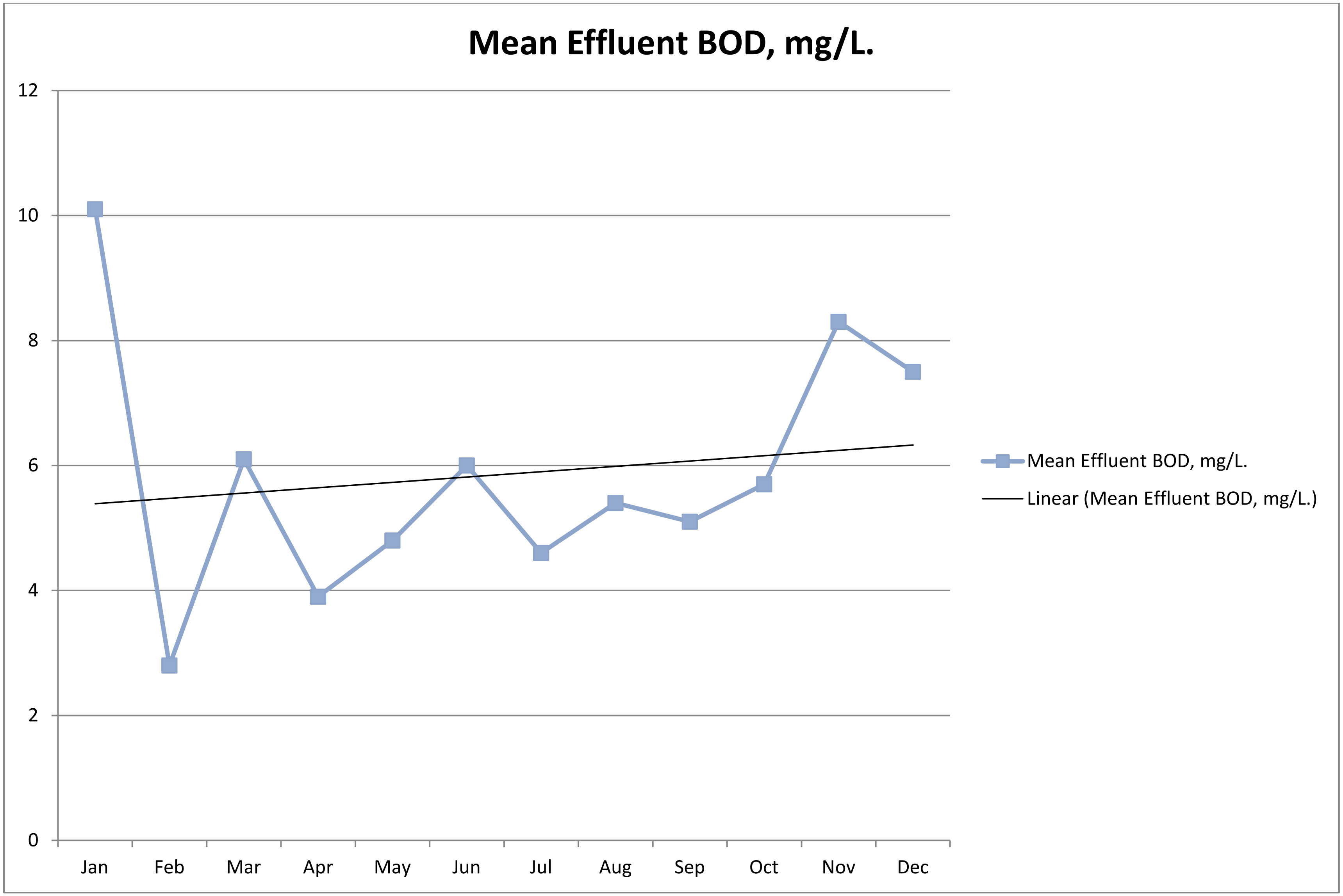
I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage 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 dculbert@ci.fortuna.ca.us or (707)725-1476.

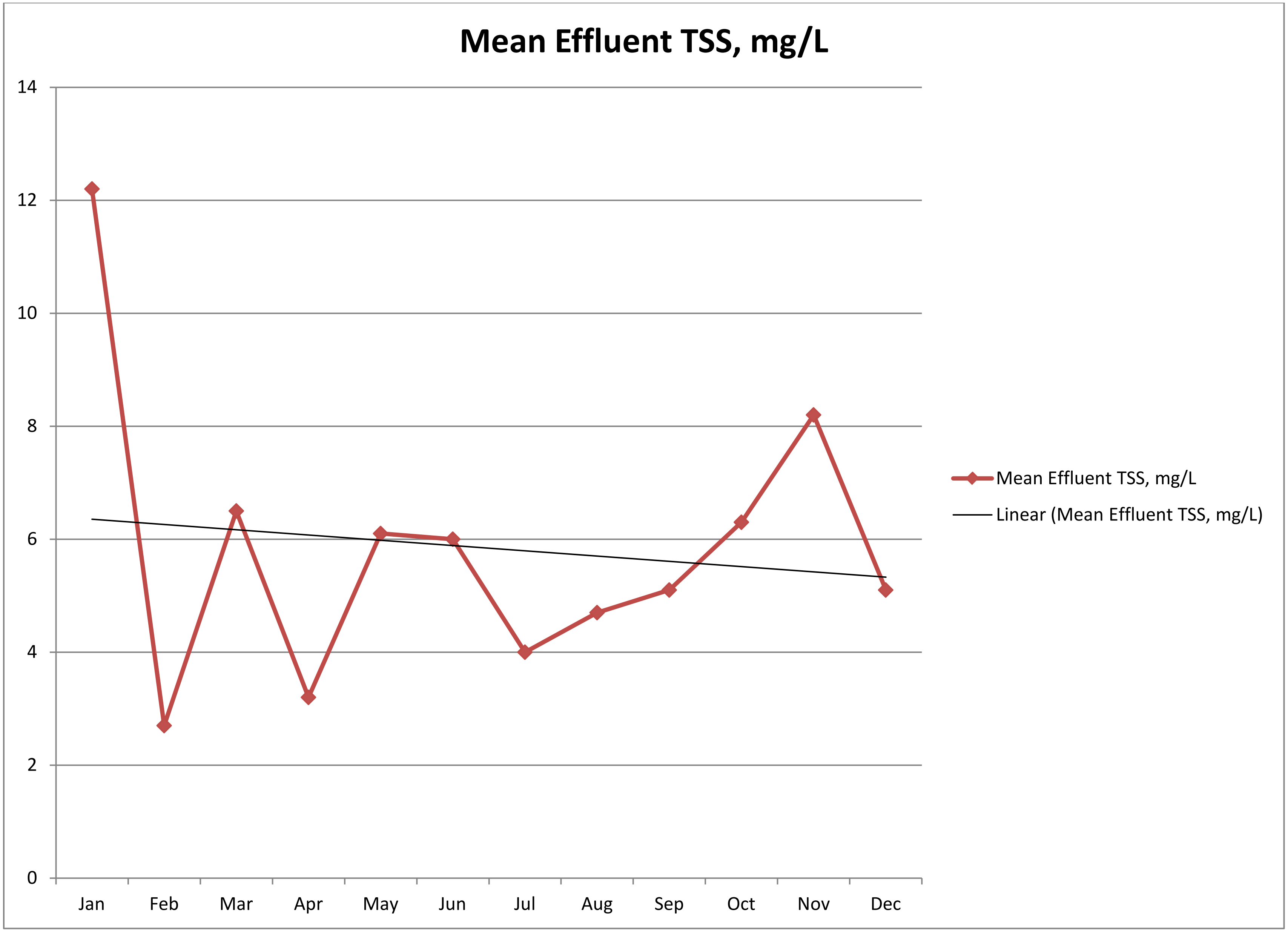
Sincerely,

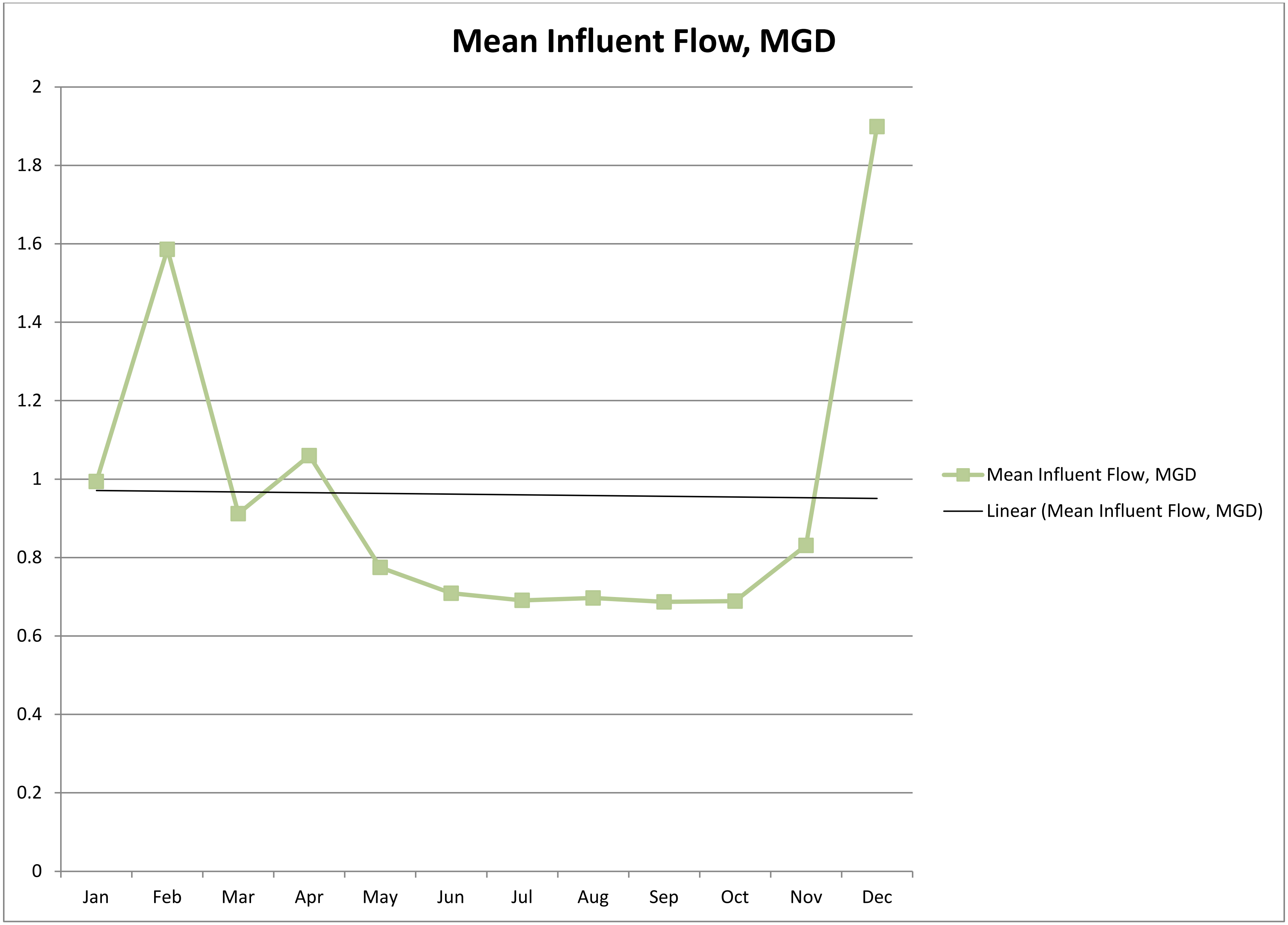
Doug Culbert, WWTPO IV-9678
Chief Plant Operator
City of Fortuna, Tom Cooke Memorial WWTP

# Appendix A PERFORMANCE CHARTS

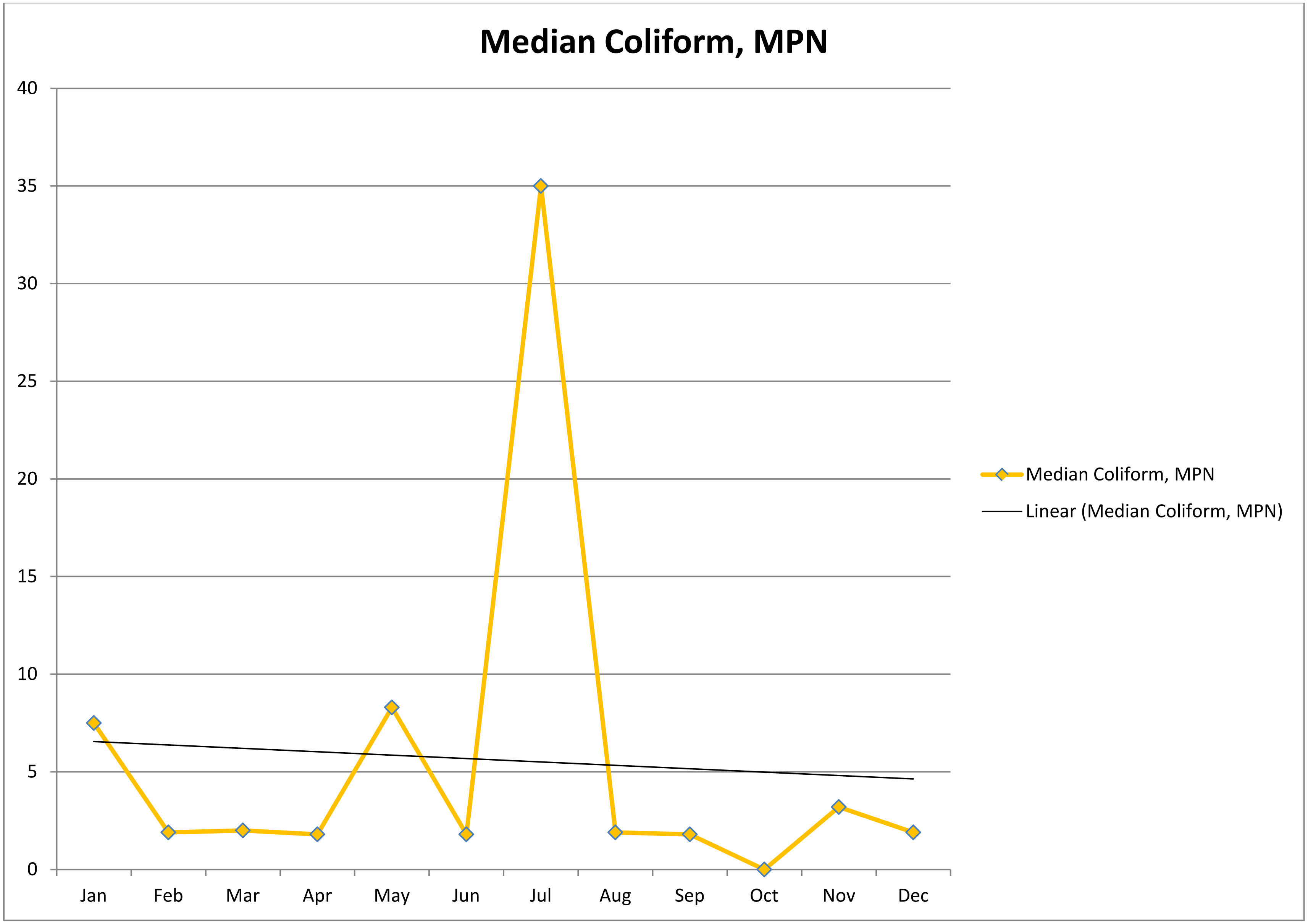


Mean Effluent BOD, mg/L.
12
10
8
6
4
2
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Mean Effluent BOD, mg/L.
Linear (Mean Effluent BOD, mg/L.)

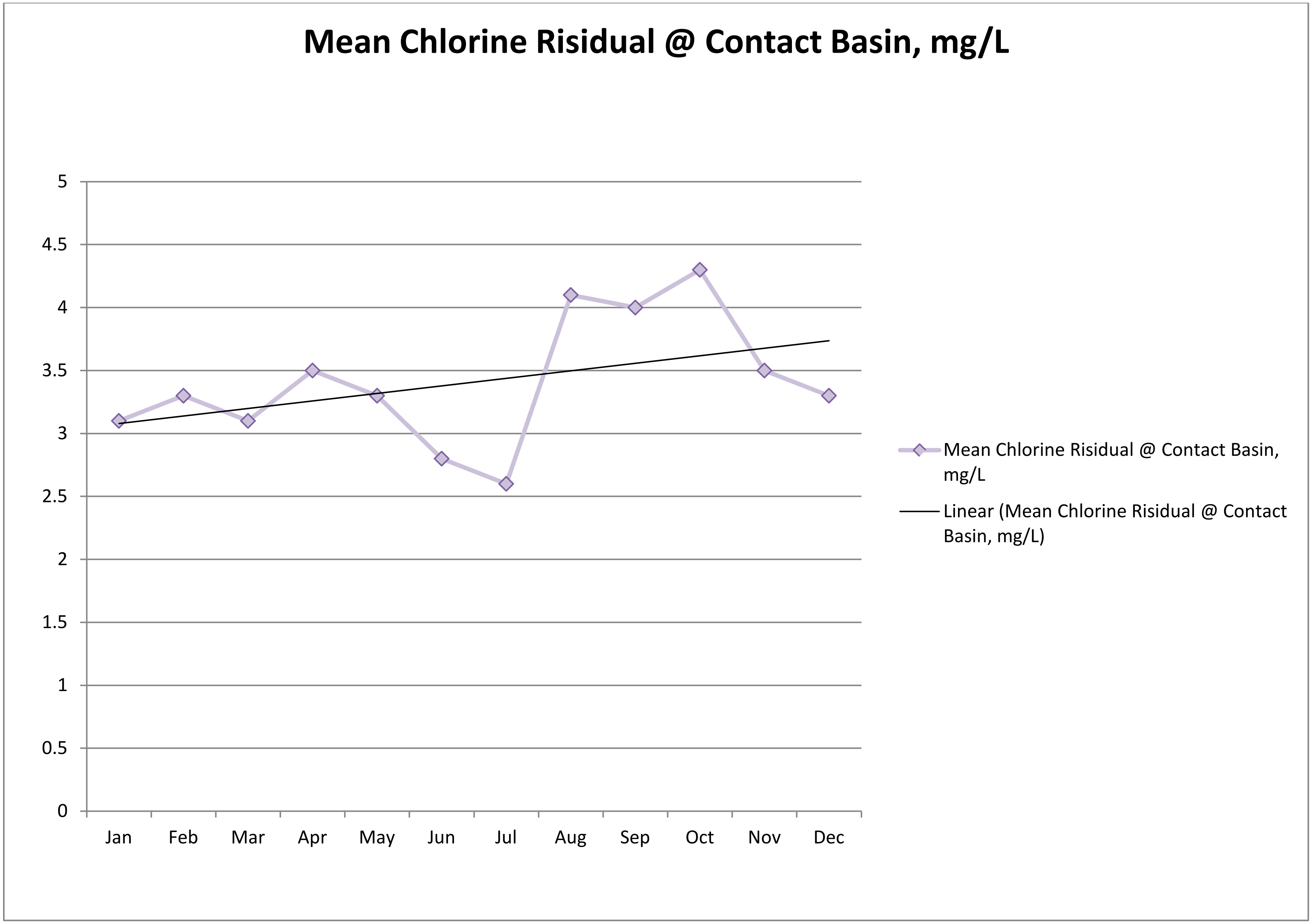

Mean Effluent TSS, mg/L
14
12
10
8
6
4
2
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Mean Effluent TSS, mg/L
Linear (Mean Effluent TSS, mg/L)

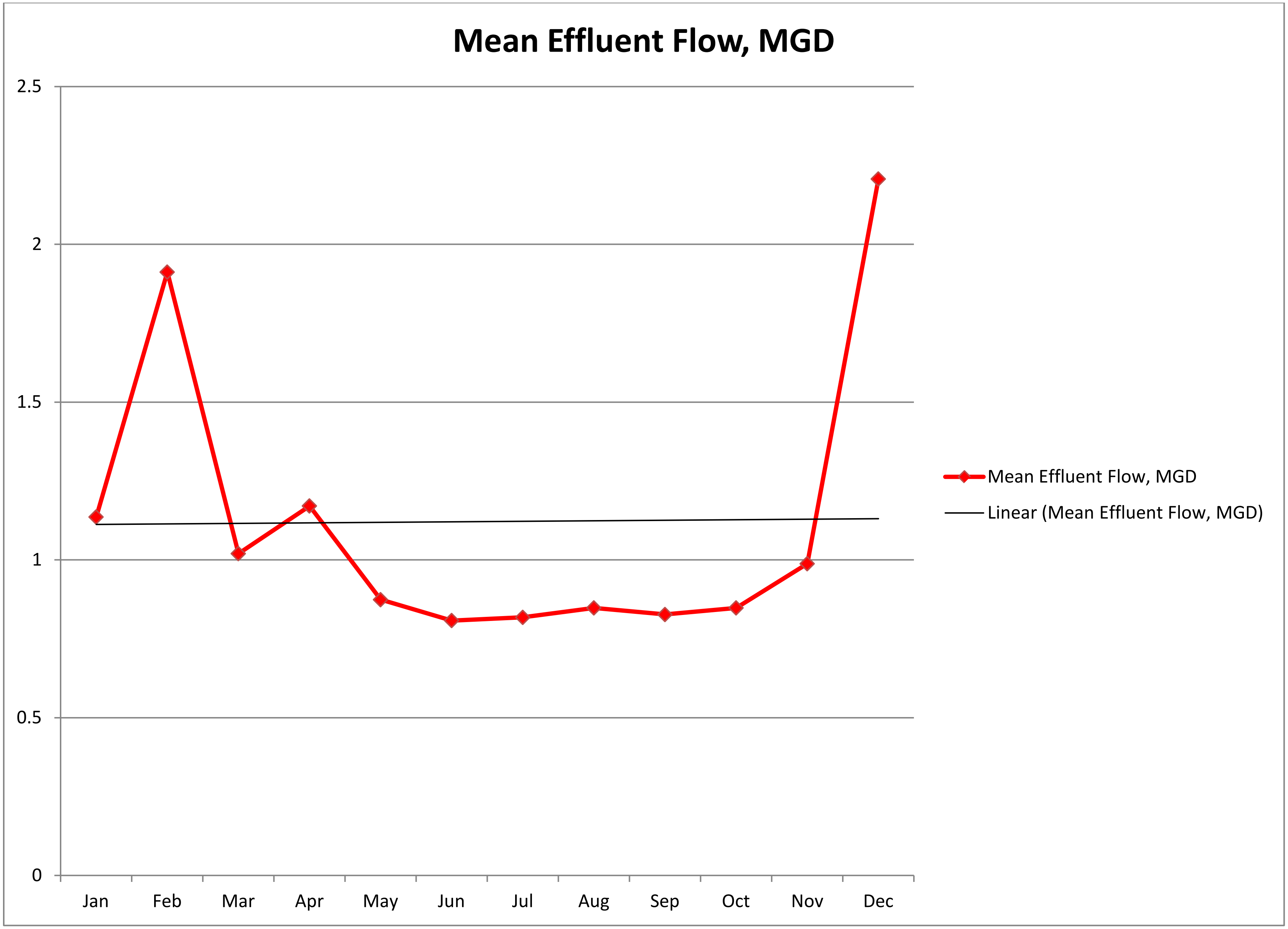


Mean Influent Flow, MGD
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Mean Influent Flow, MGD
Linear (Mean Influent Flow, MGD)

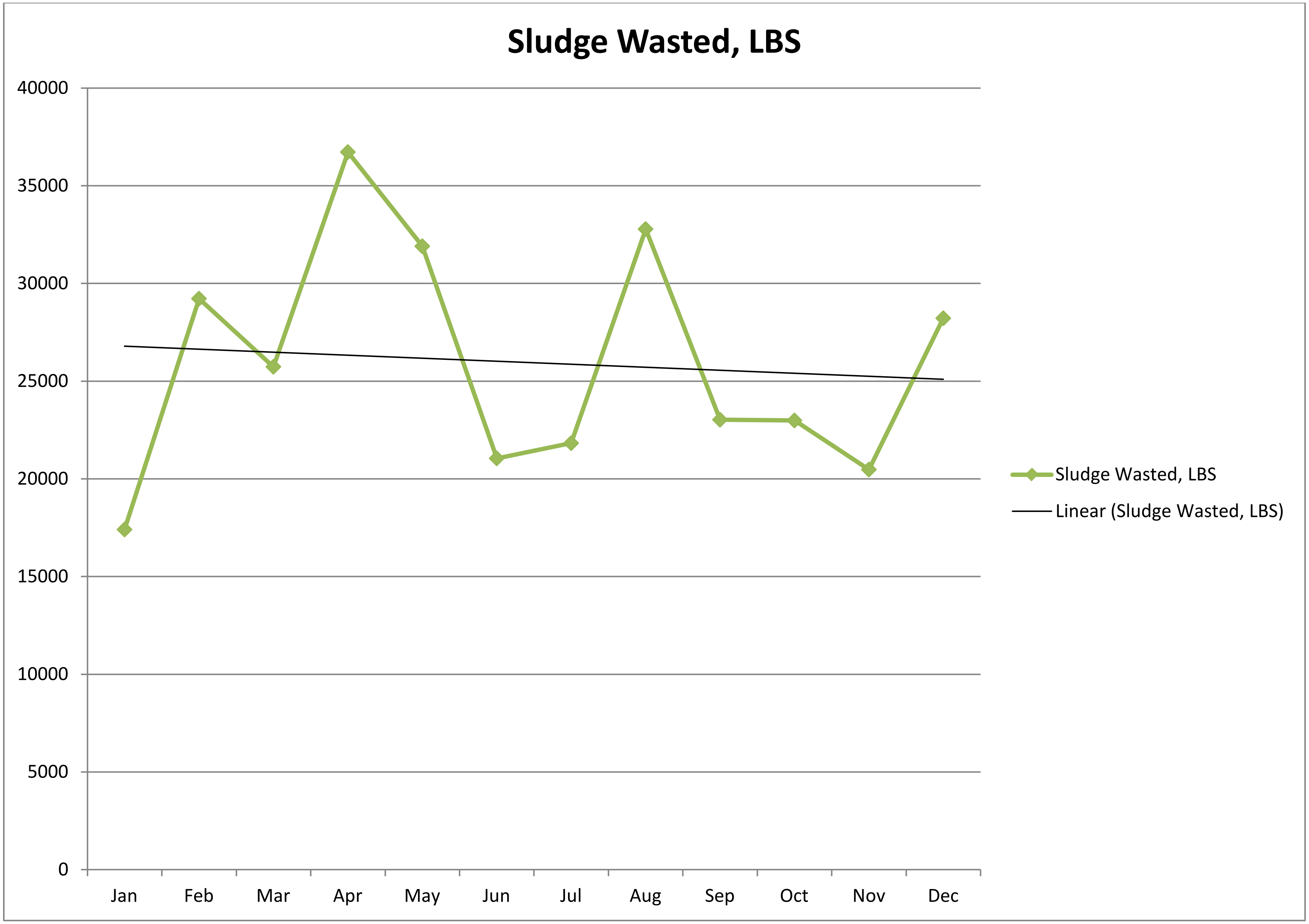


Median Coliform, MPN
40
35
30
25
20
15
10
5
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Median Coliform, MPN
Linear (Median Coliform, MPN)

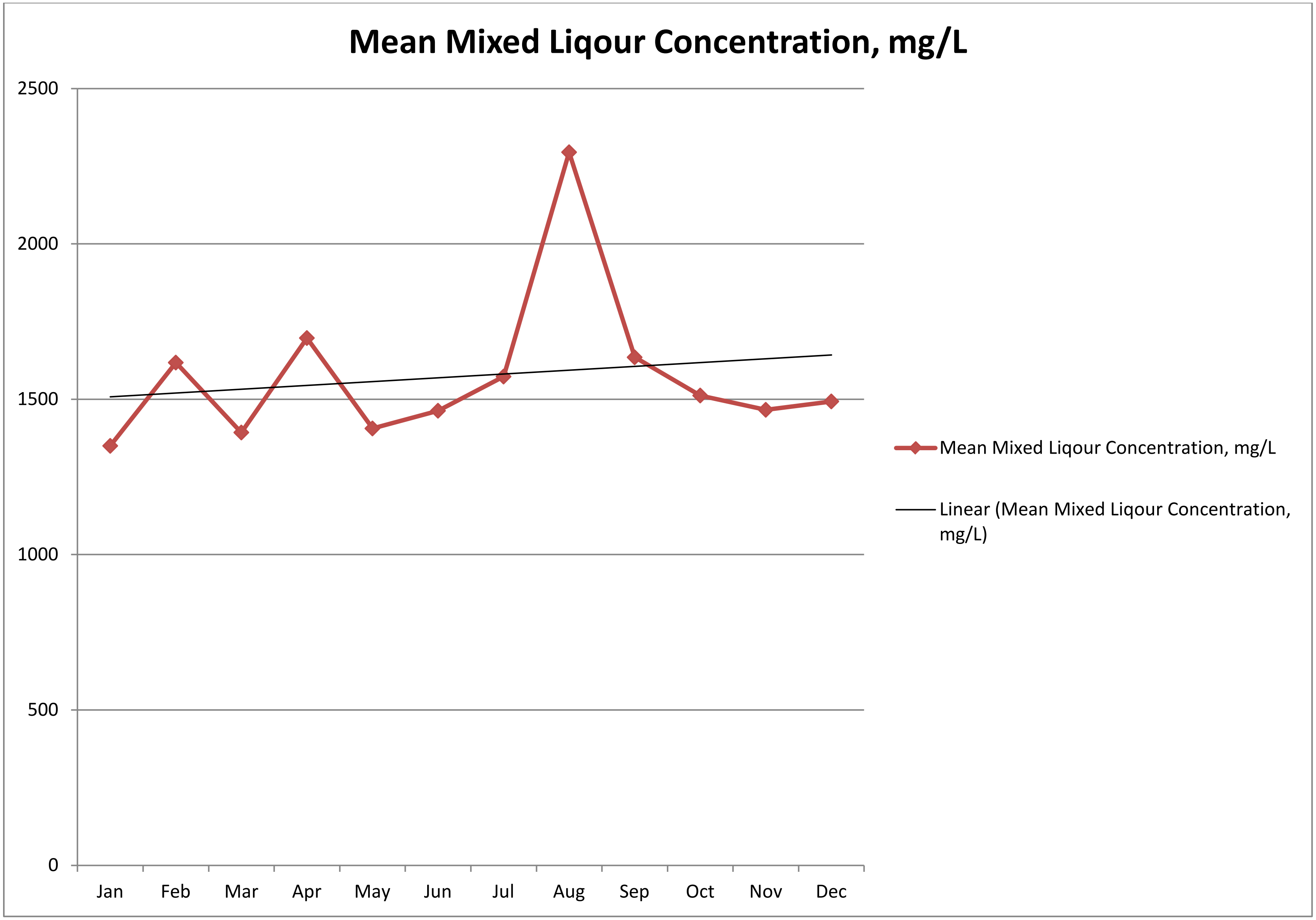

Mean Chlorine Risidual @ Contact Basin, mg/L
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Mean Chlorine Risidual @ Contact Basin, mg/L
Linear (Mean Chlorine Risidual @ Contact Basin, mg/L)

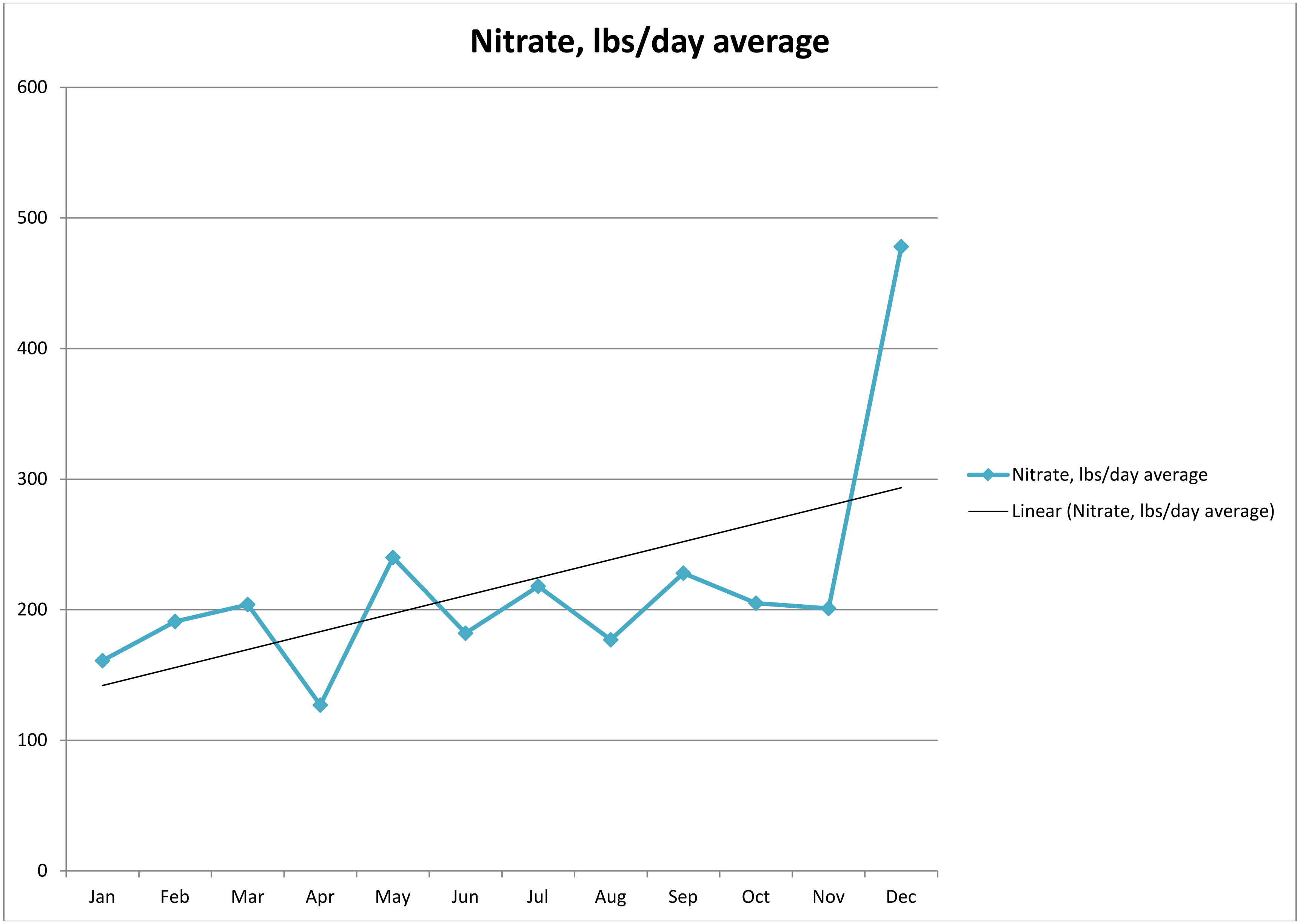


Mean Effluent Flow, MGD
2.5
2
1.5
1
0.5
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Mean Effluent Flow, MGD
Linear (Mean Effluent Flow, MGD)

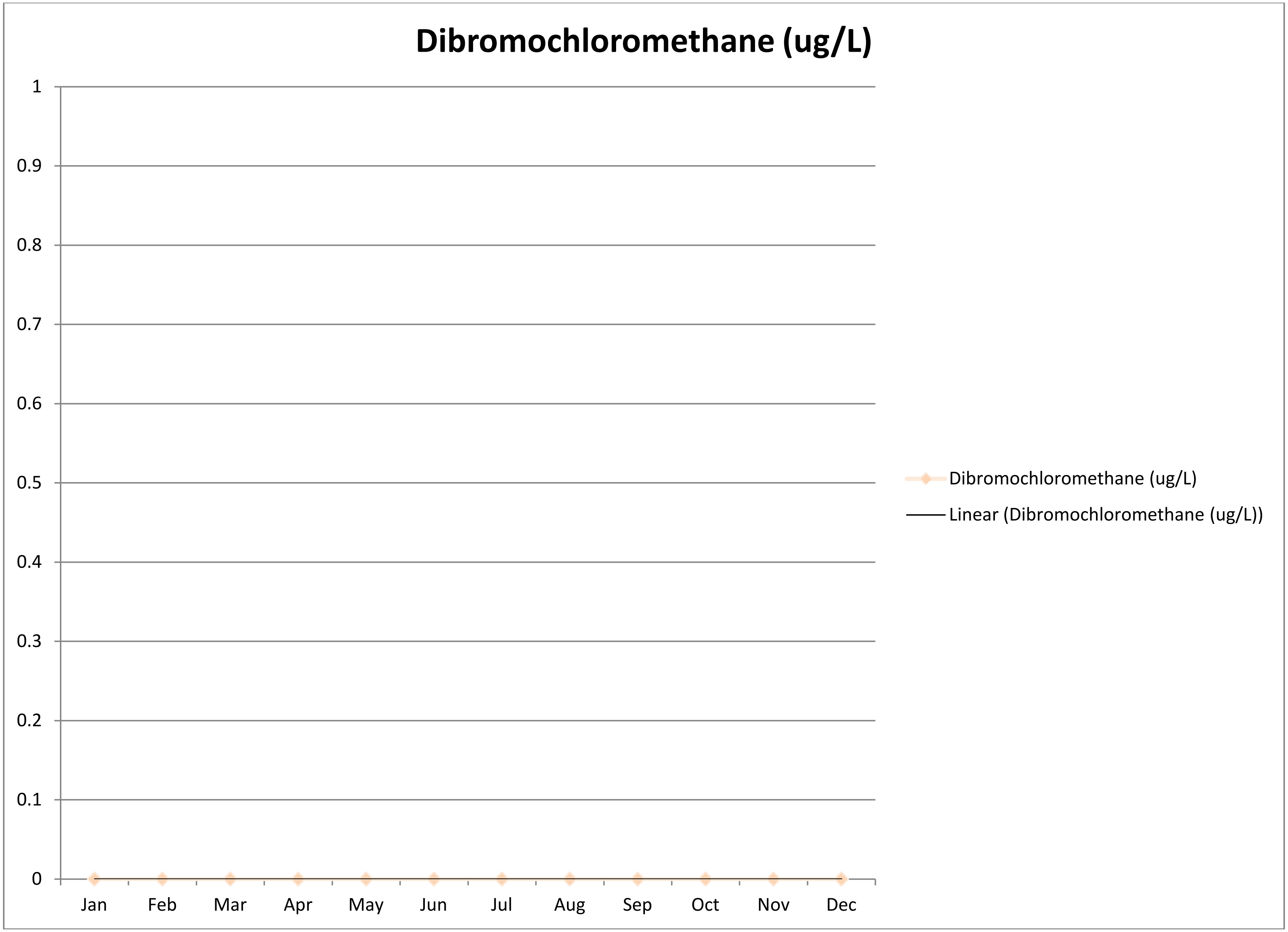


Sludge Wasted, LBS
40000
35000
30000
25000
20000
15000
10000
5000
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Sludge Wasted, LBS
Linear (Sludge Wasted, LBS)

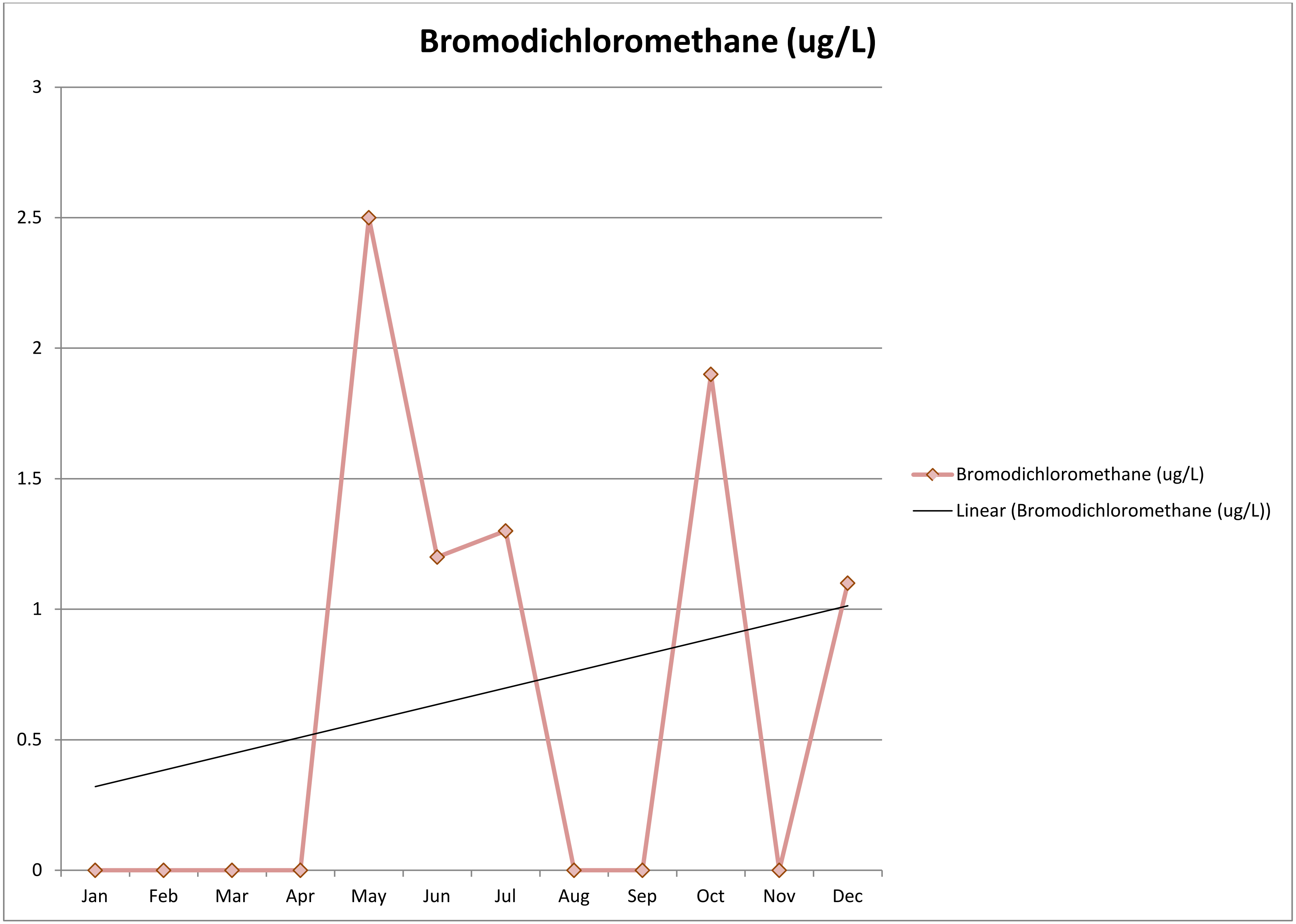

Mean Mixed Liqour Concentration, mg/L
2500
2000
1500
1000
500
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Mean Mixed Liqour Concentration, mg/L
Linear (Mean Mixed Liqour Concentration, mg/L)



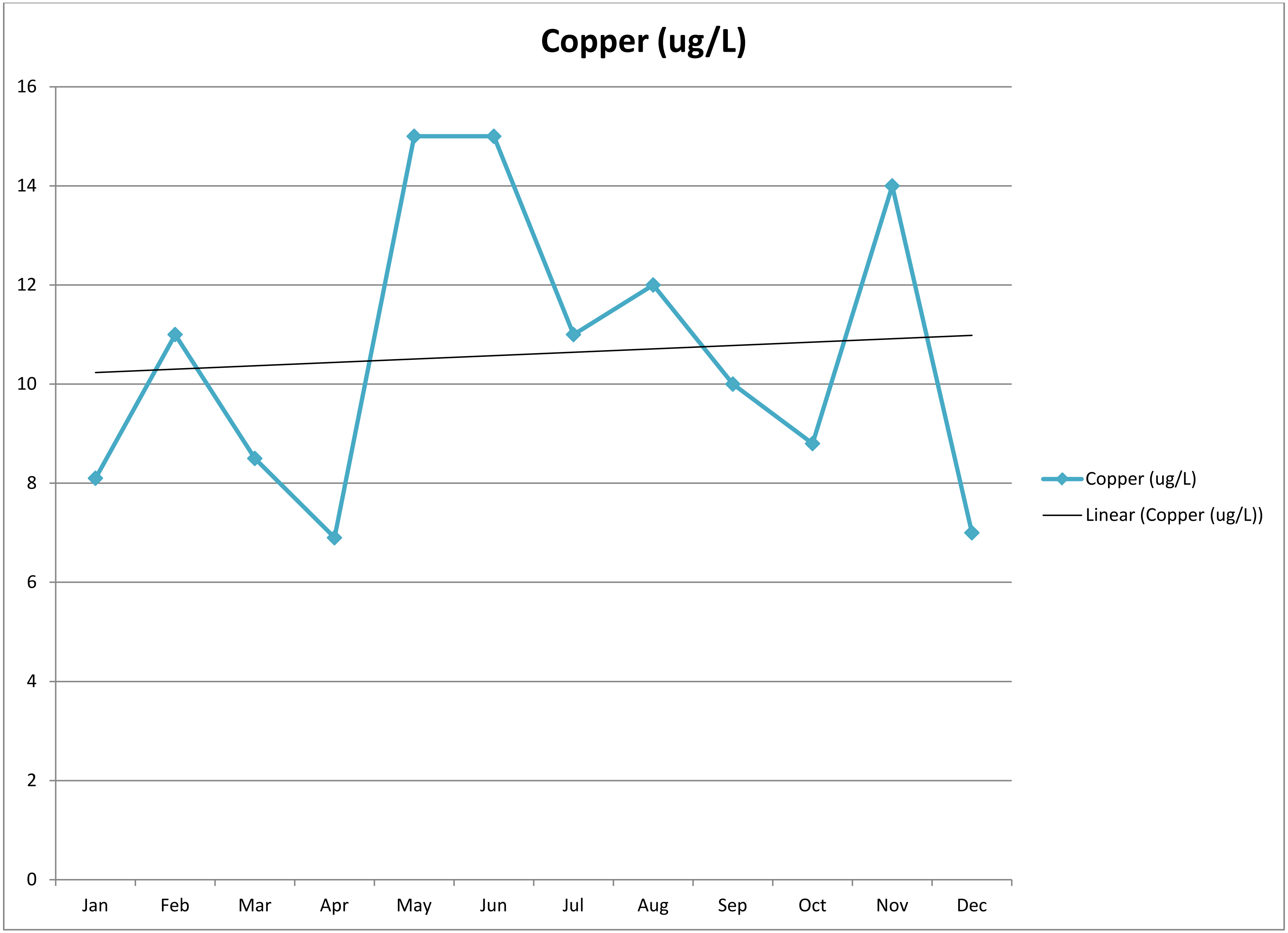
Nitrate, lbs/day average
600
500
400
300
200
100
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Nitrate, lbs/day average
Linear (Nitrate, lbs/day average)

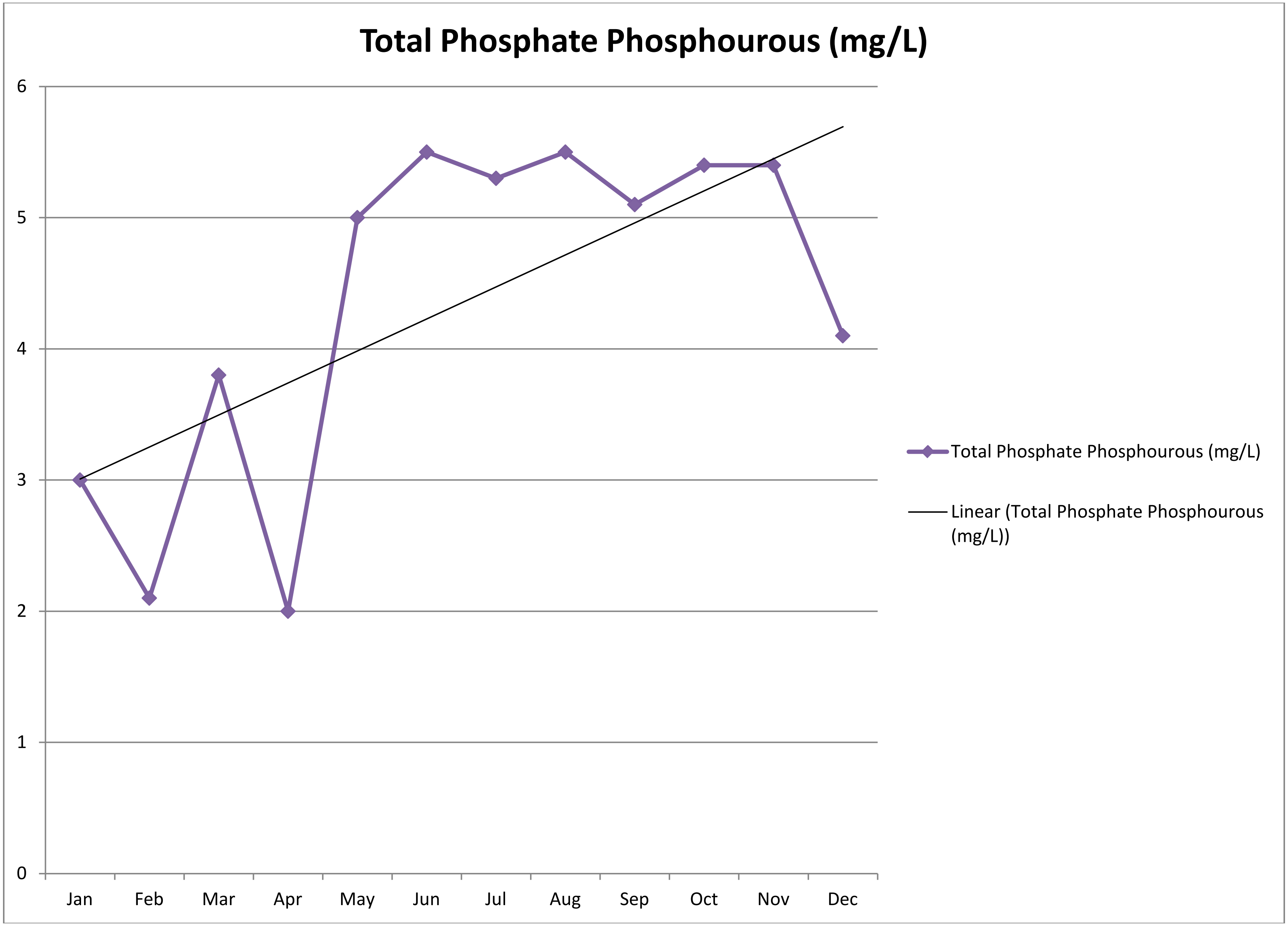


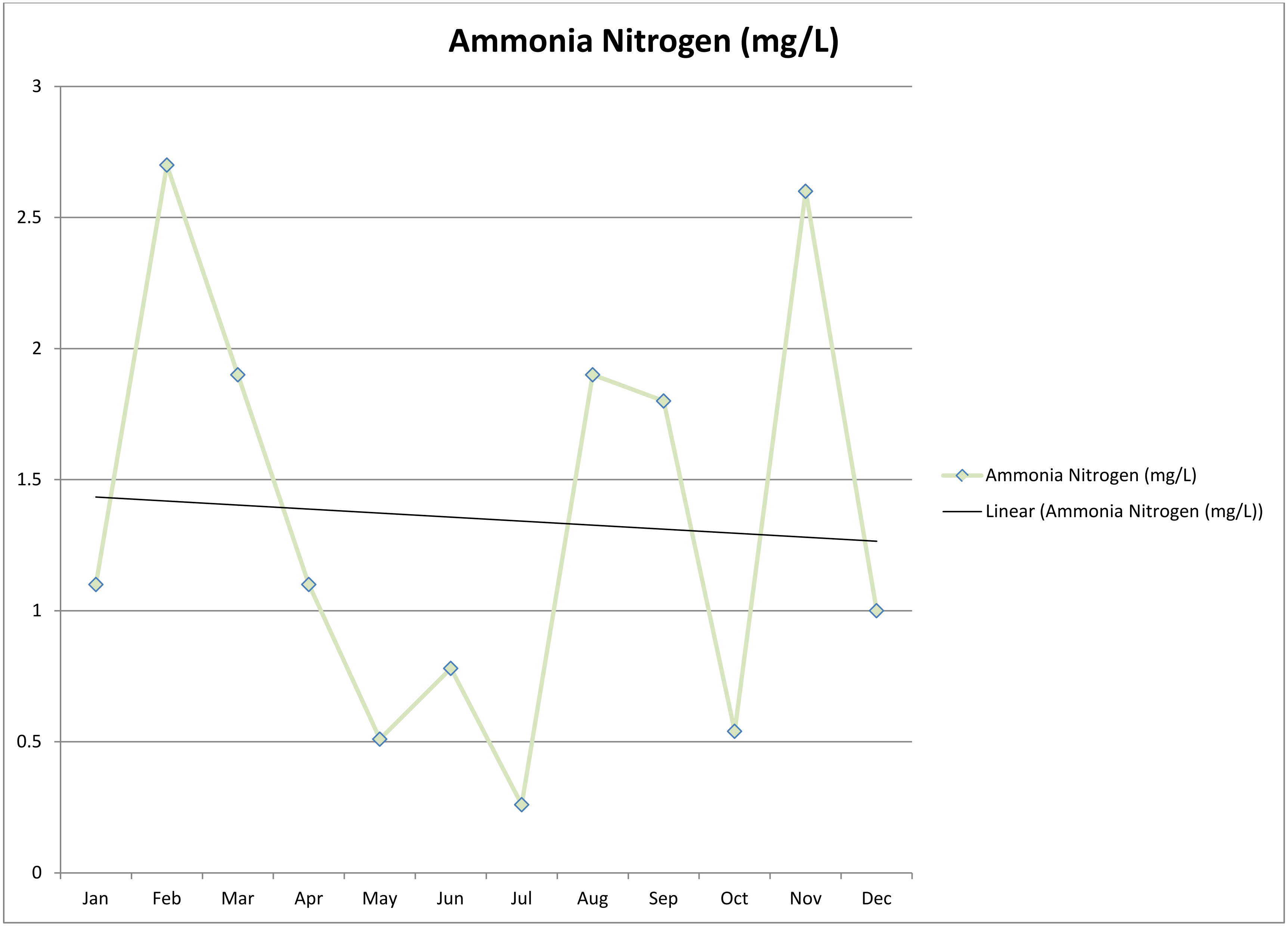
Dibromochloromethane (ug/L)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Dibromochloromethane (ug/L)
Linear (Dibromochloromethane (ug/L))



Bromodichloromethane (ug/L)
3
2.5
2
1.5
1
0.5
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Bromodichloromethane (ug/L)
Linear (Bromodichloromethane (ug/L))


Copper (ug/L)
16
14
12
10
8
6
4
2
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Copper (ug/L)
Linear (Copper (ug/L))


Total Phosphate Phosphourous (mg/L)
6
5
4
3
2
1
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Total Phosphate Phosphourous (mg/L)
Linear (Total Phosphate Phosphourous (mg/L))



Ammonia Nitrogen (mg/L)
3
2.5
2
1.5
1
0.5
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Ammonia Nitrogen (mg/L)
Linear (Ammonia Nitrogen (mg/L))