

SUMMARY

The 2018 Annual Report highlights the significant projects completed at the Gloversville-Johnstown Joint Wastewater Treatment Facility (GJJWTF). Routine assignments such as tank cleaning, instrument calibration, laboratory analysis, sample collection, general maintenance and upkeep, while important, are not identified in this report. General statistics are included to illustrate additional activities at the facility.

Digester Cleaning Project which removed 14 years of accumulated grit impacted the 2018 budget. However, the project costs were lower than anticipated.

O & M budget totaled \$4.96 million for 2018. The estimated budget was projected to be \$5.29 million. Under budget savings is \$330,000.

Electrical Synopsis:

Generated	5,255,084 kilowatt hours	
Purchased	581,855 kilowatt hours	-- \$50,945
Sold	1,207,118 kilowatt hours	-- \$51,539
Consumed	4,629,821 kilowatt hours	\$407,400 (Saved, at \$0.088/kWh)

O & M revenues totaled \$4.4 million during 2018. The Industrial contribution was 56.1%, Residential 26.1% and Trucked/Pumped waste and miscellaneous revenue totaled 17.8%. The average industrial sewer bill slightly increased. The residential rate increased 0.5%. Use of \$449,475 from the rate stabilization reserve fund helped to minimize the rate increase.

Belt Filter Presses operated 3,605 hours producing 20,300 wet tons of sludge. Fulton County Department of Solid Waste received \$692,559 to accept the sludge.

The Dairy Industry accounted for **44.7%** of the total O&M revenue collected. Together, FAGE USA Dairy Industry, Inc. and Euphrates Inc. pumped a total of **24.9 million** gallons of whey and **237.8 million** gallons of washwater to GJJWTF for wastewater processing via two dedicated pipelines.

A dedicated pipeline transported the whey to a 180,000-gallon equalization tank. Then, operators pump the whey directly to the Primary Digester at a constant feed rate. During the digestion process, the digester anaerobes produce large quantities of digester gas (~55% Methane). The COGEN System (consisting of CAT-1, CAT-2 and CAT-3) combust the digester gas to generate the electrical power used to self-power the facility. Any excess electricity is sold to National Grid per a Power Purchase Agreement.

The other dedicated pipeline transports **237.8 million** gallons of dairy washwater from FAGE USA Dairy Industry, Inc. and Euphrates Inc. to the headworks of the Contact Adsorption Settling Thickening (CAST) System. CAST successfully operated for all of 2018.

The foundation for success of GJJWTF is due to the support of the Gloversville-Johnstown Joint Sewer Board (GJJSB) and the work of its twenty-three (23) employees. As a result of the conscientious efforts by all GJJWTF employees on days, nights, weekends, holidays, during severe weather, and often in an inhospitable environment, the facility continues to operate and meet its wastewater discharge SPDES permit requirements.

The employee names (as of 12/31/18) are:

Barbara Allen	Matthew Handy	Richard Pedrick
Thomas Ambrosino	Alexander Isabella	Donna Renda
Wallace Arnold	Reuben Kennedy	Hilary Ruzycky
Ricky Barnett	Mark Levendusky	Michael VanAlstyne
Steven Burns	David Malagisi	Christopher VanAuken
Haleigh Dutcher	Catherine Maragno	Richard VanNostrand
Bruce Gardner	James McMillan	Robert Yaggle
Erich Goodemote	Lacie Newland	

PERSONNEL

The total number of NYSDEC Grade 3A and 4A license holders at this facility totals seven (7).

Retirements

Robert Henze - Laboratory Technician - 28 years of service.

Timothy Hutchinson - Motor Equipment Maintenance Mechanic - 14 years of service.

New Hires

Haleigh Dutcher joined the GJJWTF Staff as a Laboratory Technician.

Reuben Kennedy joined the GJJWTF Staff as a Motor Equipment Maintenance Mechanic.

Sick Days

Two (2) employees utilized three (3) sick days or less during 2018. The names of those employees are as follows:

Donna Renda
Hilary Ruzycky

During 2018 there were three (3) injuries reported. These injuries did not result in lost time.

WWTP Operator License Renewal – 5 Year Recertifications

Bruce Gardner, Grade 3A

Richard Pedrick, Grade 3A

All current members returned to the Gloversville-Johnstown Joint Sewer Board in 2018.

OPERATIONS AND MAINTENANCE

Several improvement projects were accomplished during 2018 with assistance from the Operations and Maintenance staff:

1. Installed LMI chemical pumps and created an injection point for potassium permanganate.
2. Relocated potassium permanganate pumps to the Thickener Building.
3. Rebuilt top end of Cogen Engine No. 3 with assistance from Milton CAT technicians.
4. Installed CB radios in all dump trucks and roll-off trucks to meet requirements from Fulton County Department of Solid Waste.
5. Raccoon burned out High-voltage feeder lines in High Yard. Maintenance staff assisted High Voltage Electric to repair feeder wires on top of power pole.
6. Installed four (4) new cross collector gear boxes and rebuilt two (2) gear boxes for finals tanks.
7. Inspected and cleaned all primary tanks. Repaired sprockets and installed fourteen (14) new flights in Primary Tank No. 3.
8. Installed a 6-cylinder diesel engine in Army Sky Trak lull forklift.
9. Relocated oil mist eliminator to outside of Cogen No. 1 Building.
10. Removed both failed COGEN exhaust Cain Heat Exchangers and their concrete pillars.
11. Installed new conduit, transducer, transducer wire, and level/totalizer control for main incoming water flow.
12. The following maintenance work was accomplished during the Digester Cleaning Project:
 - Welded and repaired all fourteen JDV stainless steel gas mixer boxes inside the digesters,
 - Greased and checked all belt presses,
 - Changed three belts on recirculation pump,
 - Cleaned and inspected all safety equipment, flame arrestors and pressure relief valves on top of Digesters,
 - Re-installed roof covers and installed new door gaskets on side doors,
13. Installed new oil mister remover on Cogen Engine No. 2. Cleaned Cogen room floor drains.
14. Installed new JDV tube and shell heat exchanger which replace the spiral heat exchanger.
15. Installed the backup Wilco mixer in the solids holding tank.
16. Installed one rebuilt valve in Post Aeration Tank to help with draining. Removed 6" stainless steel pipe to ready for UV Disinfection Project.
17. Replaced a broken 4" plug valve and gasket on whey line in the Euphrates parking lot.
18. Relocated 1 ½" city water line for gas compressor water feed in Digester. Will allow Operator's access to effluent valves without using a ladder.
19. Installed new upper wear strips on flights of Final Tank No. 4.
20. Installed new 50-HP variable frequency drive on Effluent Water Pump No. 1.
21. Replaced all twelve (12) conveyor liners on Conveyor No. 4.
22. Pulled new control wire from SCADA panel in COGEN control room to the new heat exchanger.
23. Installed a temperature sensor for outgoing sludge.

GRANTS & LOANS

Close-out of \$106,555 on the Empire State Development Grant for the CAST Project received in May.

Received \$262,730.95 in November against the NYSERDA grants for the CAST Upgrade Project

City of Gloversville secured bonding in an amount of \$2.1 million for the Ultra-Violet Disinfection Project.

GJJWTF participated in a Water Resource Reclamation Facility (WRRF) Baseline Study. This study focused on the internal planning process that facilitates the integration of capital and energy projects. The WRRF Baseline Report states that GJJWTF is a good candidate to participate in a future Capital and Energy (ICE) planning initiative.

COMPLIANCE MONITORING AND TESTING

Annual reviews of the Laboratory Quality Assurance, Test Method Standard Operating Procedures (SOP), Administrative/Quality Procedures, Monitoring and Field Activities, and Laboratory Chemical Hygiene manuals completed as scheduled.

Technical Director completed the annual internal audit of the laboratory in April of 2018.

NYS Department of Health's Environmental Laboratory Approval Program (NYS DOH ELAP) conducted their bi-annual ELAP external audit on August 13, 2018. ELAP proficiency testing (PT) was performed by GJJWTF lab staff in January/February and July/August 2018. All reported results were found to be within the NYS DOH ELAP's acceptable limits.

Laboratory Director conducted the annual ethics and data integrity training of all laboratory and monitoring personnel during December of 2018.

GJJWTF issued twenty-one (21) Industrial Wastewater Discharge Permits in December of 2018 for year 2019.

Billed industrial loadings of the permitted Significant Industrial Users (SIUs) for 2018 compared to 2017 are as follows:

Industrial Flow:	Up	8.4%
Industrial Solids:	Up	13.4%
Industrial BOD:	Up	7.7%
Industrial TKN:	Up	11.1%

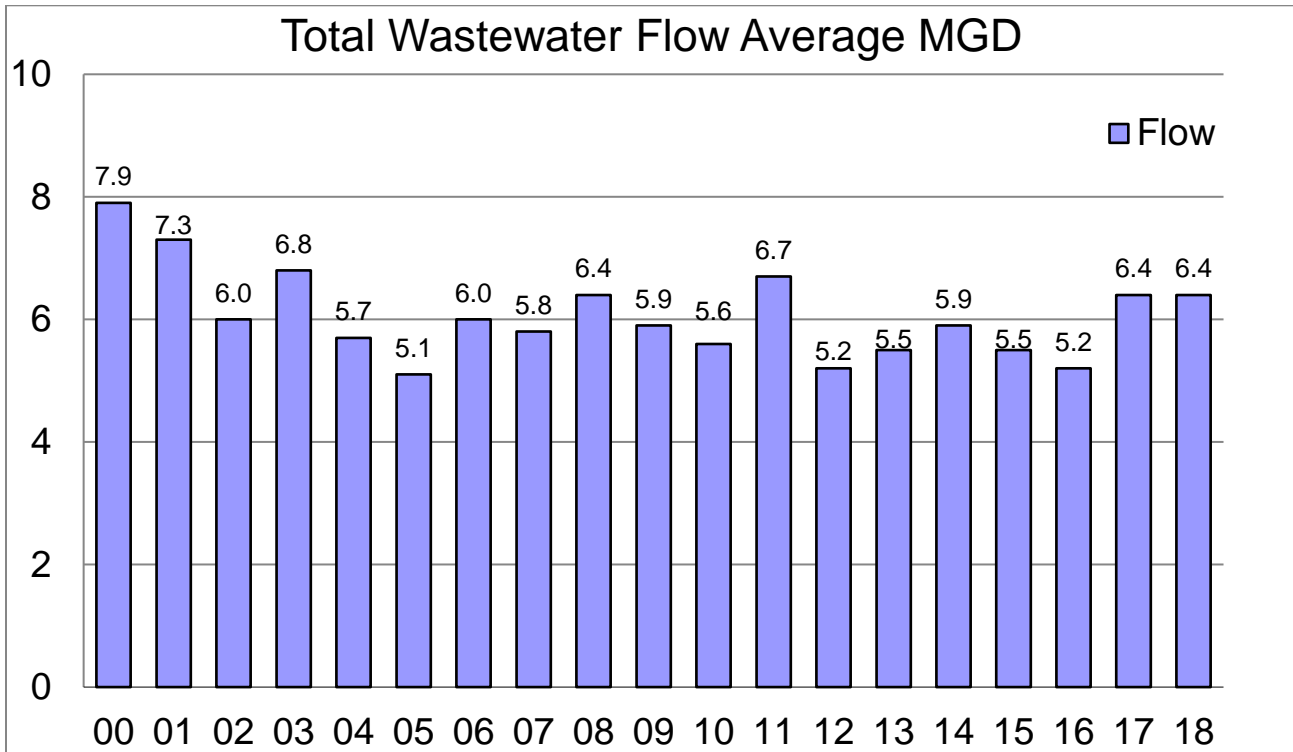
2018 had twenty-six (26) industrial violations as compared to seventeen (17) reported in 2017.

GJJWTF issued four (4) Consent Orders in 2018.

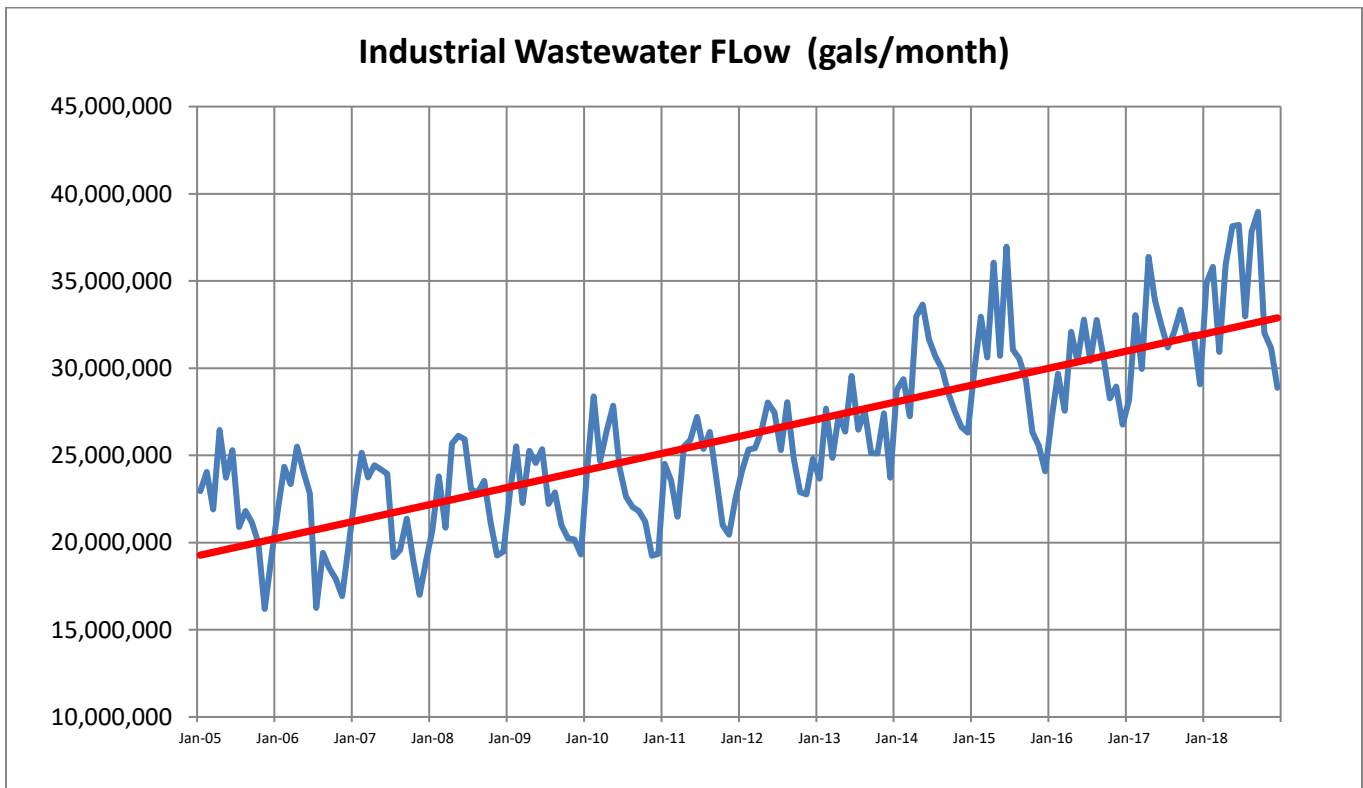
Laboratory personnel continued additional analysis of CAST project samples.

TOTAL WASTEWATER FLOWS

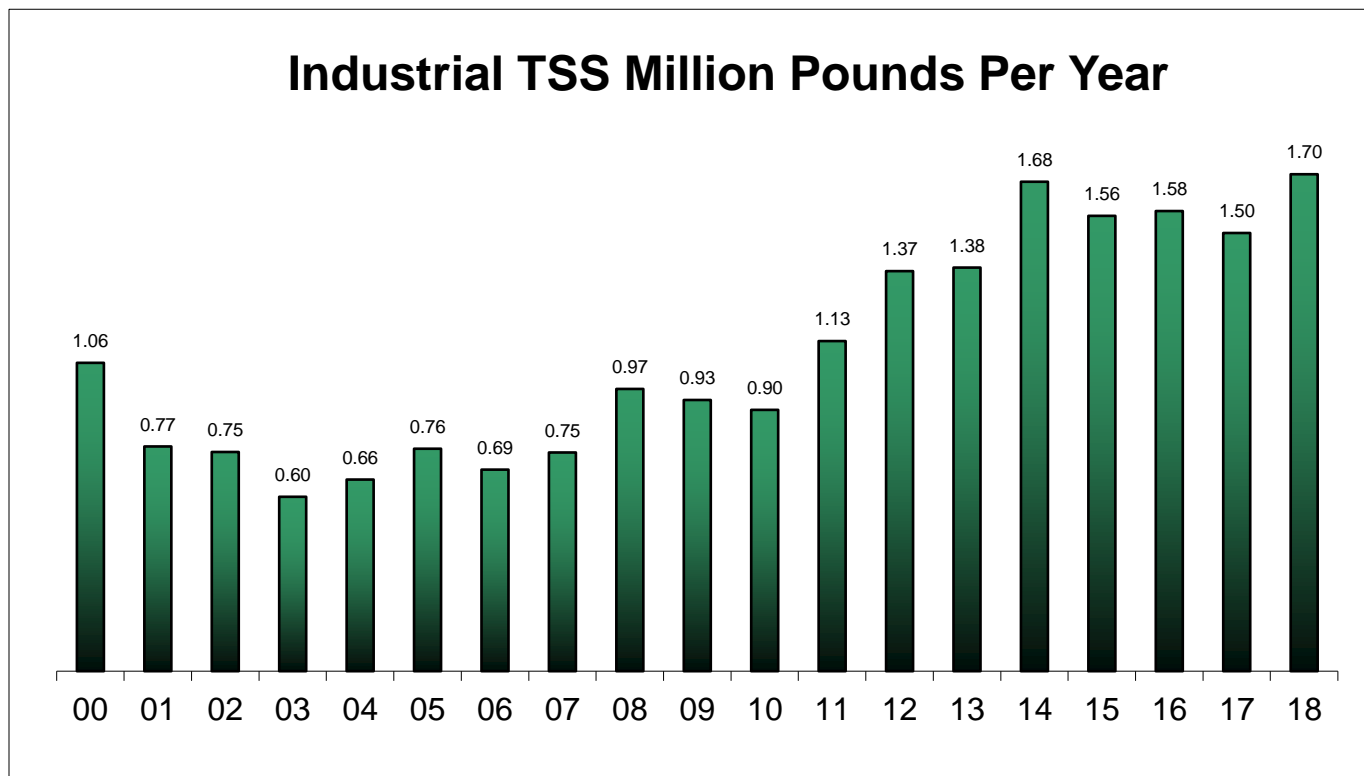
Historically, the total flow of Influent wastewater to the Plant is relatively constant.



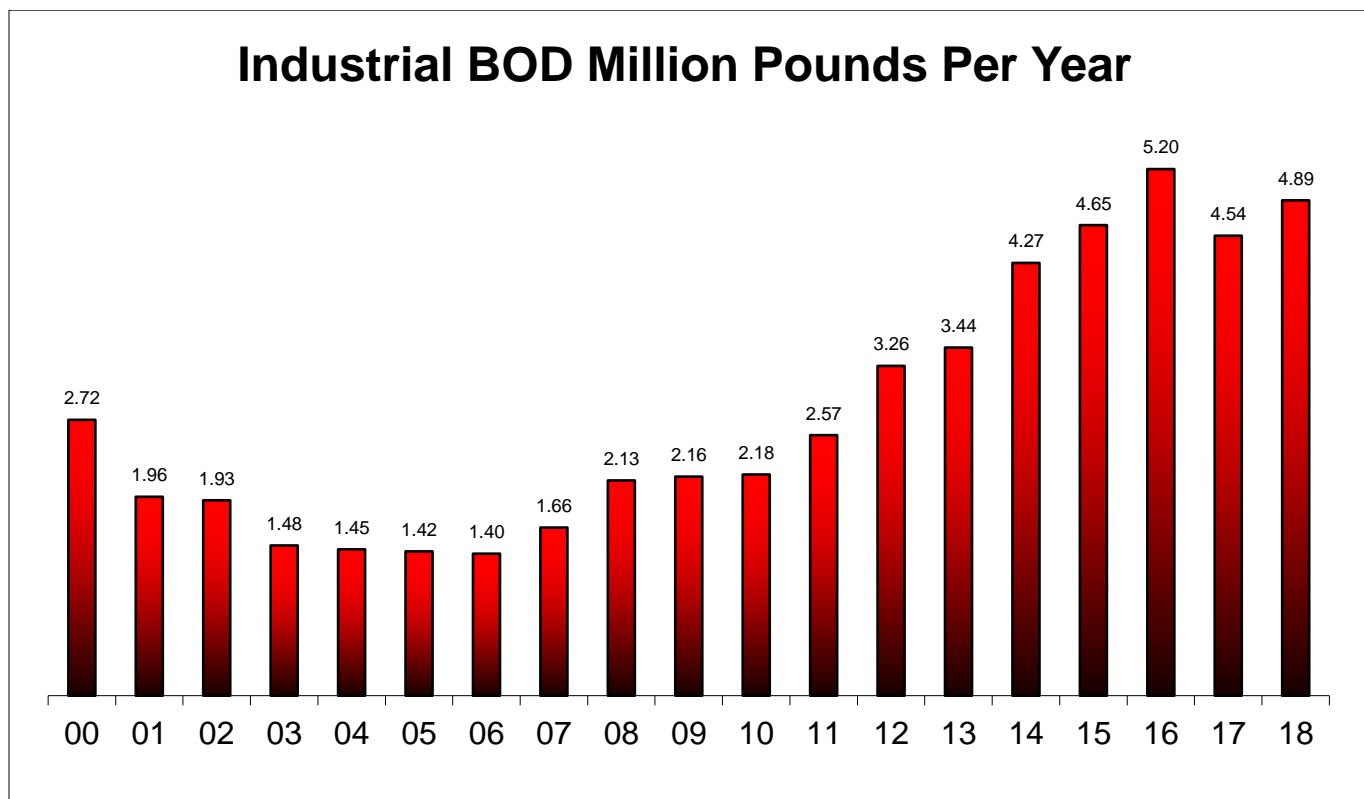
But, Total Industrial Flows increased 8.4% in 2018.



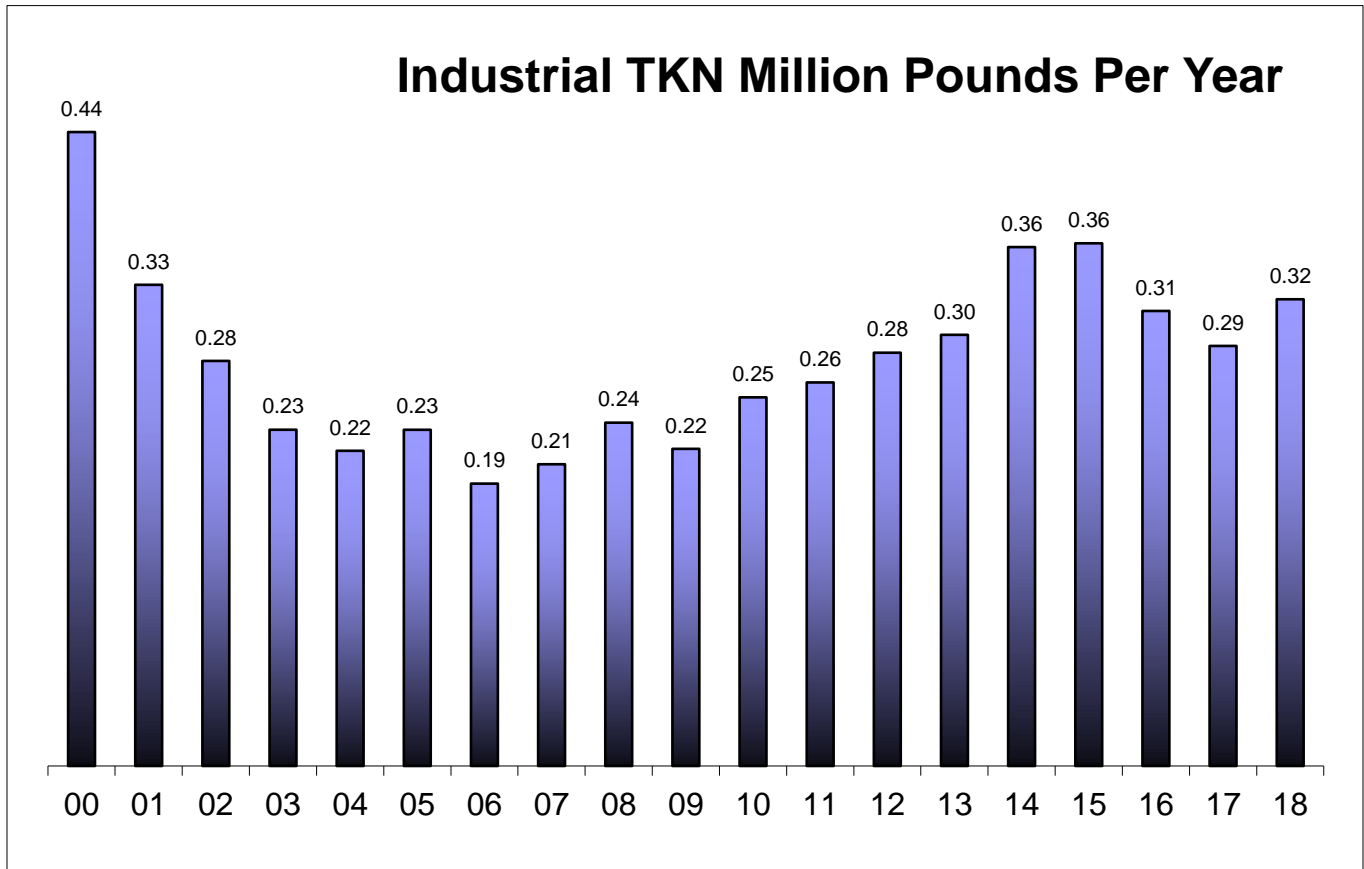
Industry: Total Suspended Solids (**TSS**) increased **13.4%** in 2018.



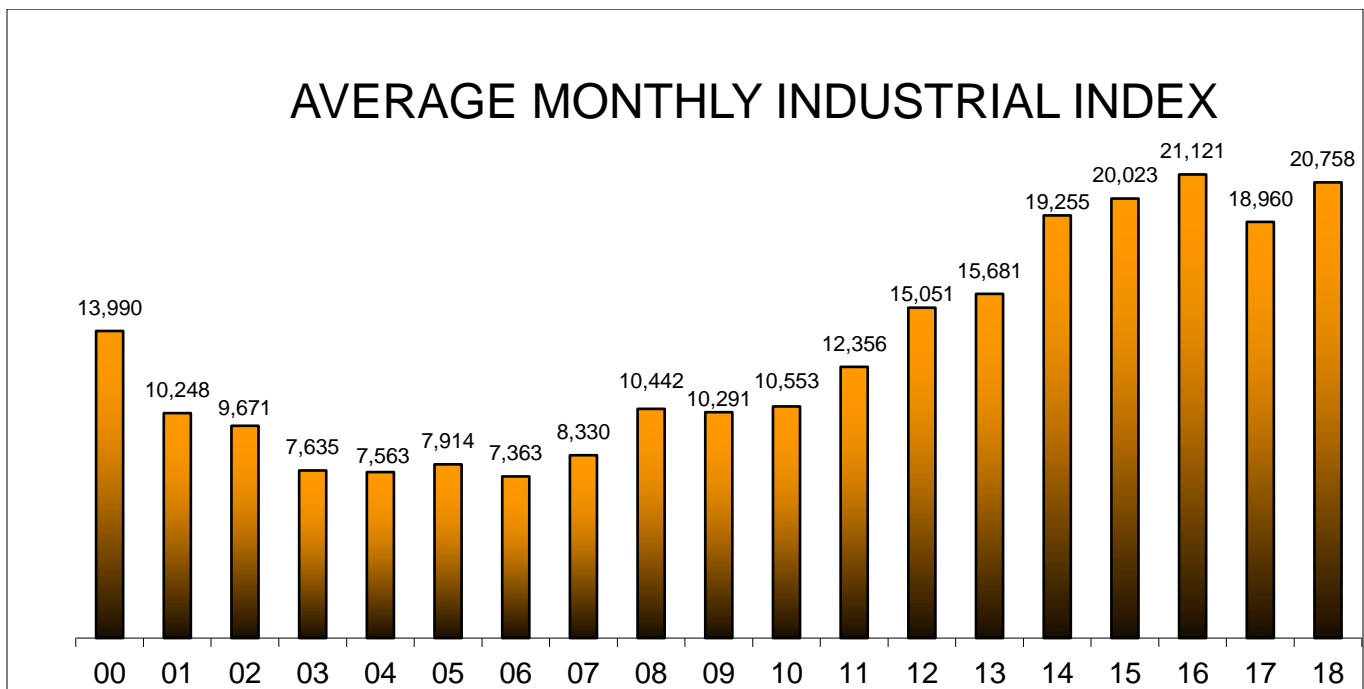
Industry: Biochemical Oxygen Demand (**BOD**) increased **7.7%** in 2018.



Industry: Total Kjeldahl Nitrogen (TKN) increased 11.1% in 2018.



Finally, in order to measure the relative strength of the industrial waste, staff developed a formula that combines TSS, BOD and TKN data. The resulting value, **Industrial Index**, provides a single numeric number. The Industrial Index increased 9.5 % in 2018.



Overall, Industrial wastewater conveyed to GJJWTF via the sanitary sewer increased in 2018.

However, the industrial index system does not incorporate the following waste streams:

- 1) Whey directly piped to the anaerobic digesters;
- 2) Dairy washwater directly piped to the CAST System;
- 3) National Grid remediation discharges;
- 4) Fulton County Department of Solid Waste's Leachate.

As shown in the graphs, industrial loadings to GJJWTF increased significantly over the previous year. Total Industrial Flows increased 8.4%. Total suspended solids (TSS) increased 13.4%. Biological Oxygen Demand (BOD) increased 7.7%. Total Kjeldahl Nitrogen (TKN) increased 11.1% in 2018.

With the CAST Project operational, the dairy washwater loadings for TSS, BOD and TKN are no longer captured by the influent sampler at the Plant's headworks. Instead, the supernatant, greatly reduced by 40% to 60% of the dairy washwater loadings, flows to the primaries. As required by permit, the dairy washwater flow is added to the Plant's headwork's recordable daily influent flow.

PLANT LOADINGS

2018 Industrial loadings (Total, Includes Dairy):

FLOW: 415,708,060 gals
 BOD: 4,892,195 lbs
 TSS: 1,704,182 lbs
 TKN: 321,653 lbs

2018 Dairy Loadings:

242,096,120 gals
 4,067,317 lbs
 1,229,094 lbs
 186,541 lbs

The FAGE dairy washwater strengths are as follows:

BOD	TSS	TKN
(mg/L)	(mg/L)	(mg/L)
1888	589	87.4

The Euphrates dairy washwater strengths are as follows:

BOD	TSS	TKN
(mg/L)	(mg/L)	(mg/L)
4373	958	182

Dairy accounts for:

- 58.2% of Industrial Flow
- 83.1% of Industrial BOD
- 72.1% of Industrial TSS
- 58.0% of Industrial TKN.

The overall wastewater load on the facility's Aeration System is greatly reduced since the Contact Adsorption Settling Thickening (CAST) Project became fully operational for all of 2018:

- 1) Average monthly BOD loadings averaged 31.1% of GJJWTF's Design BOD Capacity. October was highest at 40.1 % of Design capacity.
- 2) Average monthly TSS loadings averaged 53.0% of GJJWTF's Design TSS Capacity. June was highest at 88.9 % of Design capacity.
- 3) Average monthly TKN loadings averaged 19.2% of GJJWTF's Design TKN Capacity. June was highest at 26.1 % of Design capacity.

The wastewater Plant has received new life in its overall capacity to handle its current loads.

LEGAL/MISCELLANEOUS

The Gloversville-Johnstown Joint Sewer Board (GJJSB) continued contracting for legal services from the Glens Falls based law firm Miller, Mannix, Schachner, & Hafner, LLC (MMSH). MMSH specializes in environmental issues. The GJJSB extended the contract for legal services with MMSH through 2019.

ENVIRONMENTAL

Enforcement of the New York State Department of Environmental Conservation (NYSDEC) State Pollutant Discharge Elimination System (SPDES) permit continues. This stringent effluent permit regulates the discharge limits of a multitude of parameters measured on a daily, weekly, monthly and/or annual basis.

GJJWTF was not in full compliance with the SPDES permit conditions during 2018. One (1) non-compliance event occurred on September 19, 2018 for Settleable Solids.

GJJWTF received a Notice of Violation from NYSDEC dated March 26, 2018 for odors.

GJJWTF did not enter any NY-Alerts for 2018.

GJJWTF received NYSDEC's Conditional Approval on a Pilot Basis to continue using Potassium Permanganate for effective odor control and Aluminum Chlorohydrate for improved CAST sludge settling.

OPERATIONS

The year-to-year removal efficiency rates for the GJJWTF are as follows:

Parameters	2012	2013	2014	2015	2016	2017	2018
Total Suspended Solids	97%	98%	97%	97%	98%	95%	97%
Biochemical Oxygen Demand	99%	99%	98%	99%	99%	98%	98%
Total Kjeldahl Nitrogen	92%	91%	79%	92%	92%	91%	93%

As shown in the Table, the TSS and BOD removal efficiencies exceed the permitted removal rate of 85% prior to discharge to the Cayadutta Creek.

Belt Filter Presses (BFPs) operated 3,605 hours producing 20,300 wet tons of sludge. During 2018, sand and/or dried sludge was blended into the sludge cake to meet the minimum 20% solids landfill disposal requirement.

Together, the BFPs and Gravity Belt Thickeners (GBTs) utilized 35,750 pounds of polymer (0.9%, ↑). In addition, the BFPs used another 7,585 gallons of an emulsion polymer (9.7%, ↑) to enhance sludge dewaterability, up 37%.

During 2018, the GJJWTF purchased 35,494 gallons of Ferrous Chloride (0.2%, ↑) to control sulfides at the anaerobic digesters. GJJWTF also purchased 54,470 therms of Natural gas to heat various buildings (5.9%, ↑).

CONTACT ADSORPTION SETTLING THICKENING SYSTEM (CAST)

In 2018, the newly operational CAST System required the purchase of two new chemicals:

- (1) For odor control, operations added 41,825 pounds of Potassium Permanganate to the CAST Process Mix Tank and the CAST Settling Tank.
- (2) For quick and effective settling of the CAST settleable solids, operations added 925 gallons of Aluminum Chlorohydrate to the CAST Settling Tank. The settleable solids are pumped to the Solids Holding Tank which also receives primary sludge.

BACKFLOW PREVENTERS

Adirondack Mechanical Corp. and the GJJWTF maintenance staff tested and repaired all backflow preventers on-site. The nine (9) backflow preventers are working as designed to keep the Plant effluent from entering and contaminating the City's drinking water supply. Three (3) of the backflow preventers had test ports cleaned and two (2) repaired for leaking onto the floor.

SULFA-TREAT VESSEL

Precision Industrial Maintenance removed and discarded spent media (AxTrap 4003) which scrubbed the digester gas of Hydrogen Sulfide. Replacement media purchased under the old contract was loaded into the vessel. The media lasted from 6/21/17 to 9/25/18, or 15 months. Staff replaced the media at the completion of the Digester Cleaning Project.

LEACHATE

GJJWTF processed 20.9 million gallons of leachate in 2018. This represented an 21% increase compared to 2017. The Fulton County Landfill pumped leachate to the facility via a dedicated five (5) mile long force main.

ENERGY RECOVERY

The Dairy Industry pumped **24,890,134 gallons of whey** via a dedicated pipeline directly to two (2) whey storage tanks located at GJJWTF. From these tanks, operators pump the whey at a constant feed rate to the anaerobic digesters. Then, anaerobic bacteria break down the whey and expire large quantities of digester gas (~ 55% Methane and 45% Carbon Dioxide).

The Anaerobic Digester System produced **150.3 million cubic feet** of biogas from the whey, CAST Washwater Settleable Solids, Primary Sludge and Waste Activated Sludge.

The biogas generators combusted 80% of this gas to generate **5.26 million kilowatt hours** of electricity.

The biogas generators (CAT-1, CAT-2 and CAT-3) rated at 1100 kilowatts (max design) supplied 90% of GJJWTF's electrical needs in 2018.

The dairy BOD strengths for whey are as follows:

FAGE (mg/L)	Euphrates (mg/L)	Blended (mg/L)
41,375	67,278	56,000

FAGE's yogurt product creates a relatively low BOD strength whey byproduct. Euphrates' feta cheese product creates a relatively higher BOD strength whey byproduct.

ULTRA-VIOLET (UV) DISINFECTION PROJECT

Delaware Engineering, D.P.C. agreed to provide consulting engineering services for the UV Disinfection Upgrade Project on October 30, 2017.

Contractors awarded bids for the project include:

BCI Construction, Inc., Albany, NY for the General Construction

Spring Electric, Inc., Averill Park, NY for the Electrical Contract

Contractors broke ground in August 2018 to lay electrical cables from the Aeration Building to the Post Aeration Building. Construction activities are scheduled until February 2019.

HEAT EXCHANGER PROJECT

GJJWTF purchased a new 3.5 Million BTU per hour, shell & tube, sludge heat exchanger for \$174,700. The new heat exchanger replaced the old spiral heat exchanger. During the winter months, cooling water from CAT-1 and CAT-2 supply the necessary hot water to maintain the temperature of the anaerobic digesters. The optimum temperature for GJJWTF's anaerobic digester is 98.6°F (Body Temp).

During past winter seasons, the digester temperature has dropped to as low as 87.5°F. At 85°F, the anaerobe bacteria in the digester cease, as well as digester gas production. The new heat exchanger will not only maintain the optimum temperature but even transfer enough heat to raise the temperature of the digester under winter conditions, if necessary.

DIGESTER CLEANING PROJECT

GJJWTF shut down, drained and de-gritted both Primary and Secondary anaerobic digesters between May 29 and September 25, 2018. The previous digester cleaning occurred in 2005, 14 years ago.

Sub-contractor, Precision Industrial Maintenance, Inc. removed 337 dry tons of accumulated grit from both digesters. The Primary Anaerobic Digester accounted for 216 dry tons of grit versus 121 dry tons of grit from the Secondary Digester. While drained, GJJWTF's maintenance staff repaired and welded breaks on all the bubble jet diffuser boxes. Operations and maintenance staff scraped and removed struvite from all internal surfaces inside the digesters.

During the Digester cleaning, GJJWTF reduced the quantity of whey accepted from FAGE and Euphrates Inc. However, GJJWTF did not restrict the quantity of washwater received from the dairy industry as the CAST System was not affected.

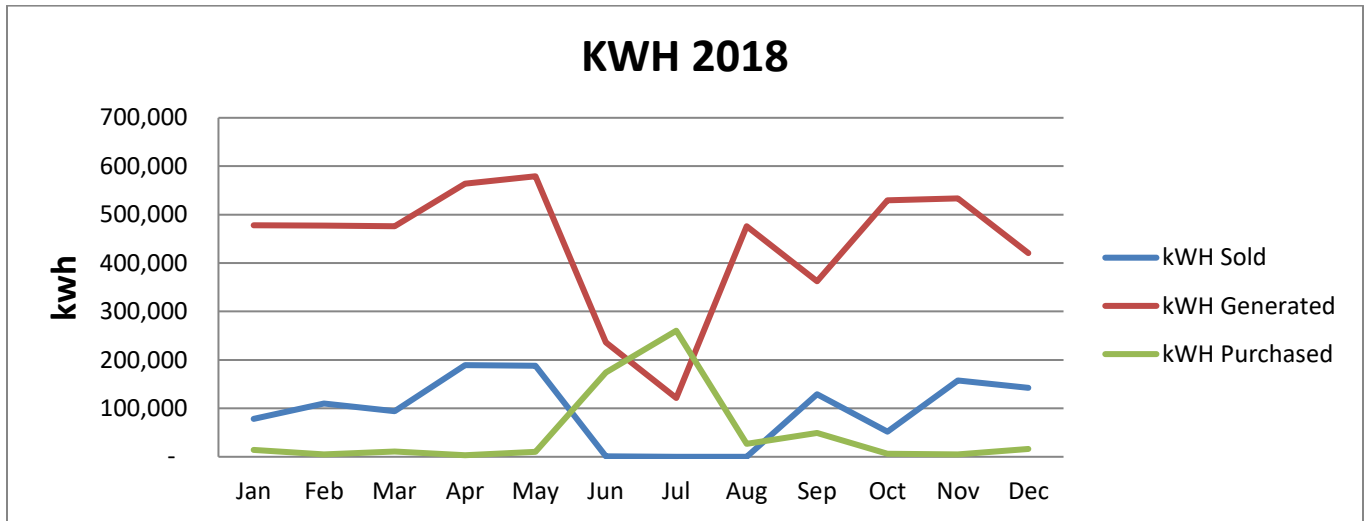
At various times during the Digester Cleaning Project, GJJWTF did purchase electricity and natural gas from National Grid when the digester methane was greatly reduced or zero. As a result, there were times when insufficient digester gas existed to self-generate electricity. At the same time, without the COGEN System operating, the digesters required heat to get to temperature to start producing digester gas. Consequently, the furnace boilers were energized to add heat to the digesters. These boilers may operate on either digester gas or natural gas.

The Digester Cleaning Project was underbudget. At the completion of the project, direct costs were \$157,500. Indirect costs were \$40,670.

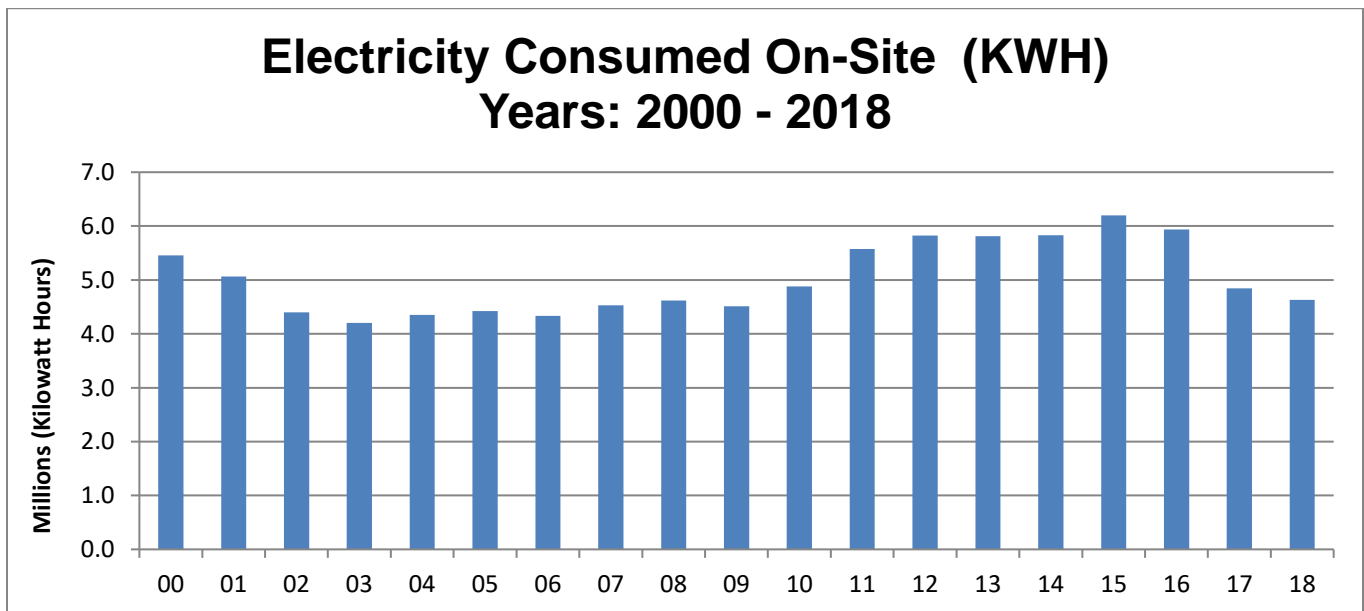
The Digester Cleaning Project greatly impacted GJJWTF self-generation of electrical power as shown in the electrical profile graph. The next digester cleaning is 10 years away.

In comparison, the CAST System greatly reduced aeration power consumption from the highs in 2015 and 2016, as shown in the electrical consumption graph. CAST was partially operational in 2017 and fully operational in 2018. Hence, the noticeable drop in power consumption over the last two years.

Electricity Profile at GJJWTF:



Electrical Power Consumption at GJJWTF:

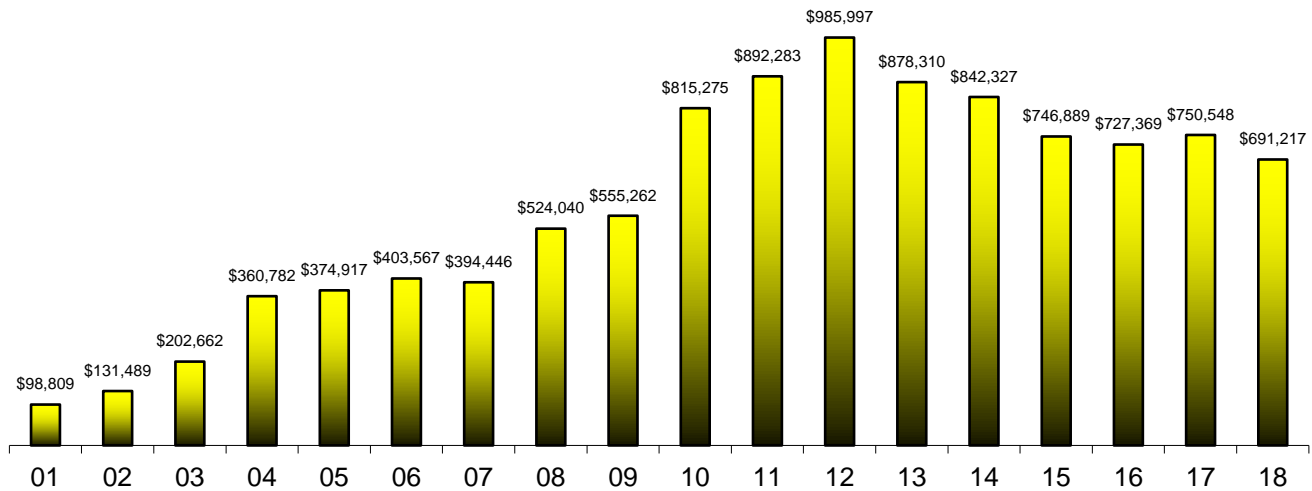


FINANCE OFFICE

O&M revenues totaled \$4.4 million during 2018. The Industrial contribution was 56.1%, Residential 26.1%, and Trucked/Pumped waste and miscellaneous revenue totaled 17.8%. Compared to 2017, Trucked/Pumped waste and miscellaneous revenue decreased by 7.9% and the industrial contribution increased by 11.0%.

Continued marketing to make surrounding communities and entities aware of what our facility has to offer proved beneficial during 2018. All trucked/pumped high strength waste contracts were renewed with existing customers during the year. For 2018, trucked & pumped waste receipts totaled \$691,217. The single largest trucked waste contract was Adirondack Septic.

TRUCKED & PUMPED WASTE REVENUE



FAGE USA Dairy and Euphrates Inc. pumped **24.9 million** gallons of whey directly to the facility via a dedicated pipeline during 2018. The whey was reduced by 13.0% compared to 2017 in gallons treated due to the Digester Cleaning Project. During the Digester Cleaning Project, GJJWTF could not accept whey for a period of about 4 weeks and imposed a reduced whey delivery schedule of another 7 weeks. The 19.2 million gallons of whey from FAGE resulted in GJJWTF receiving 67% of the whey revenue normally collected.

The total quantity of whey received during 2018 from FAGE and Euphrates Inc. decreased 13.7%.

Sewer rates were adopted after a public hearing in April 2018. The average industrial sewer bill increased slightly, while the residential rate increased 0.5%. Rates remained relatively stable due to a variety of reasons including the use of \$449,475 of rate stabilization reserve funds.

The 2017 Financial Audit Summary from Bollam, Sheedy, Torani & Co. disclosed no issues of noncompliance, and no alternative procedures or corrective actions were suggested.

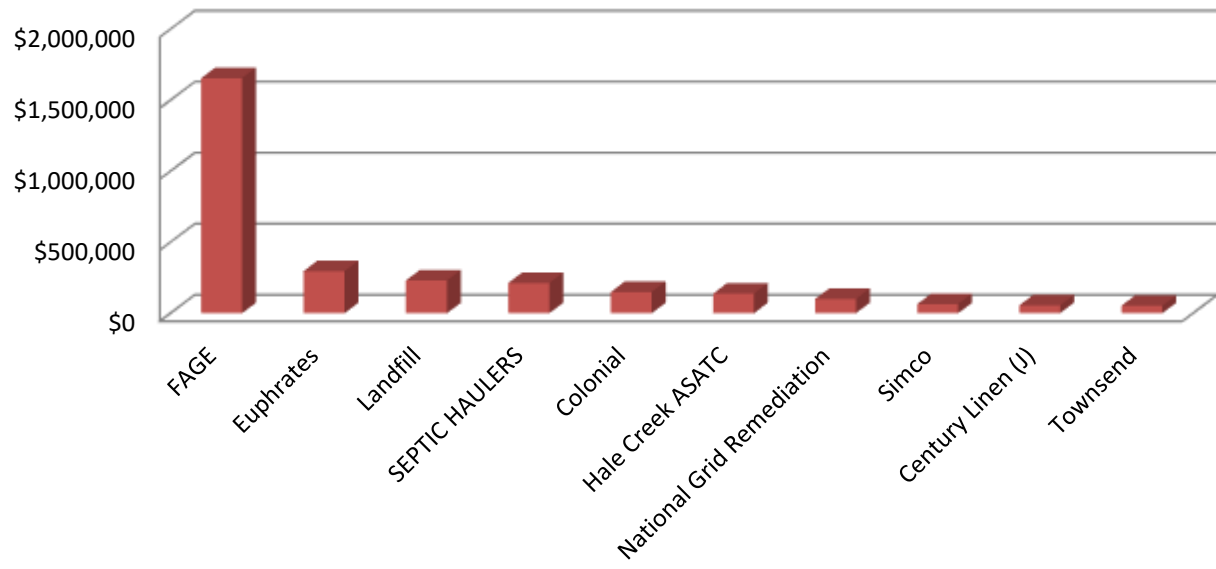
INDUSTRIAL USE

O&M revenue from industrial users increased 11% in 2018. FAGE USA Dairy Industry, Inc. ranks as the Number 1 user. Euphrates Inc. ranked as the second largest user of the wastewater facility.

One (1) trucked waste account in the septic haulers category and three (3) leather industries (Colonial Tanning, Simco Leather and Townsend) were in the top ten of revenue producers.

Fulton County Landfill Leachate, Hale Creek ASATCA, National Grid remediation site and Johnstown's Century Linen and Uniform round out the top ten largest customers of the facility in 2018.

2018 Industrial O&M Revenue





Large raccoon climbs utility pole and trips out a sewage treatment plant.

Photo from Newsletter - High Voltage Electric Service, Inc. (HVES), Fall 2018 Customer Update. Recovery damage was \$9,539.



The Heat Exchanger above left replaced the Spiral Heat Exchanger on the right.



Grit inside Primary Digester



Precision VAC Truck outside Primary Digester



VAC Trucks outside Secondary Digester



VAC discharging into Sludge & Press Building



UV Disinfection Buried Electrical Cables



Finger Weirs Control Water Level on UV Bulbs



New Knife Gates to Stop Flow



Discharge Channel's Rebar for UV Modules



Banks of Installed UV Tube Modules



First Wall of UV Building Enclosure