

CTE Student Requested
City of Buchanan Wastewater Treatment Plant
February, 2023

The City of Buchanan Wastewater Treatment Plant would benefit from having a CTE student join our crew during the school year of 2023/24 and possibly during the summer of 2023 as well.

According to The Northeast Guide for Estimating Staffing at Publicly and Privately Owned Wastewater Treatment Plants the City of Buchanan WWTP should have 4.32 people on staff. In completing the staffing estimation exercise, I used the category for plants that receive a flow of 0.5 – 1.0 million gallons per day (MGD). The City of Buchanan WWTP is designed to accommodate 1.33 MGD, but receives about 0.9 MGD. Given that the size of the plant and the equipment that we have is designed for a flow of 1.33 MGD, not the 0.5 – 1.0 MGD that was used in this estimation, and that our actual flow is at the high end of the category 0.5 – 1.0 MGD, I believe that 4.32 staff members is a low estimate. Currently the wastewater department has two full time employees and one person on loan from the department of public works. I have attached the completed staffing estimation exercise to this document.

Three people is barely adequate for the basic running and maintaining of the plant and lift stations. If someone quits or has to go on an extended medical leave we would no longer be capable of maintaining the WWTP's equipment. Even a weeklong vacation would be major disruption to plant operations. The plant can run successfully with 3 people, and it has been before, but the people all need to be highly competent and very hard working.

The City of Buchanan WWTP is responsible for a state mandated Storm Water Pollution Prevention Program (SWPPP) for our facility. The SWPPP requires: weekly inspections, quarterly sampling of storm water, maintaining a written SWPPP, maintaining a licensed Industrial Storm Water Certified Operator on staff (currently we have only one), cleaning catch basins, cleaning swales, completely rebuilding the filter at outfall 3 every year, annual staff training, quarterly visual assessment reports, and an annual report to the state. The SWPPP is not included in the staffing estimation exercise that is attached to this document.

We are also required to execute a state mandated Industrial Pretreatment Program (IPP), which, we are not able to properly implement at this time. Ideally, we should be inspecting every factory, auto repair shop, marijuana grow facility, and restaurant annually. As of today, no restaurant's grease trap has ever been inspected. Only one minor marijuana grow facility has been inspected, and most factories have not been inspected in over 2 or even 3 years.

The City of Buchanan has a surcharge system in place that allows users who discharge wastewater that is stronger than the average residential waste stream to be billed a surcharge that covers the additional cost of treating their pollutants. Currently only the Southeast Berrien County Landfill is part of our surcharge program. It is extremely likely that all of Buchanan's marijuana growers/processors are discharging high levels of ammonia, solids, phosphorus, and CBOD, and they should be included in the surcharge program. This could generate a significant amount of revenue for the enterprise fund. At this time, our staffing situation does not allow us to pursue an expansion of our surcharge program.

The City of Buchanan WWTP has a federally certified and fully equipped laboratory on site. In the past the Buchanan WWTP provided laboratory services to smaller communities in Berrien County. Baroda and Galien have both contracted with the City of Buchanan to have their wastewater analyzed in our laboratory. Three Oaks is another local community that does not have a laboratory. Providing laboratory services to smaller communities in Berrien County would generate additional revenue for the enterprise fund. At this time our staffing situation does not allow us to implement a program for the use of our laboratory to generate additional revenue.

Adding a CTE student to the Wastewater Department would do more than just address the inadequate staffing situation. The City of Buchanan is about as small as a community can be and still have big city infrastructure and programs. At a bigger plant, like Niles, where they have significantly more employees than us, they can rely on their Superintendent, Lead Operator, and Head Maintenance person to keep things right. Those three people are all competent, responsible, trustworthy adults who are deeply invested in achieving good outcomes at the plant; everyone else can be -- to use crude terms -- an unskilled, low-wage, worker bee. At Buchanan we have 3 employees; every single one of us has to be absolutely top-notch if we are going to be successful. Few top-notch people are going to switch careers to come here for \$19.81 an hour.

We need to be recruiting people based, not on the wages they will earn today or even in the near term, but on the value that earning wastewater licenses will bring to them 4-6, or more, years down the road. Most top-notch adults are not in a position to accept \$19.81 an hour in the hope of someday being superintendent of a class B or A wastewater treatment plant; a high school kid is. The CTE program is a way that we might be able to attract and retain the sort of high-quality person that the Buchanan WWTP absolutely must have if we want to achieve state mandated requirements, adequately maintain our infrastructure, and generate additional revenue to keep costs down for our neighbors.

The City of Buchanan WWTP can be run successfully with 3 people. It has been before, but to make it work all 3 people need to be highly competent and very hard working – our current staff cannot be described in those terms. Getting new programs up and running, like adding businesses to our surcharge schedule and using our lab to provide contract lab services for other communities will require additional labor until the programs are implemented.

I would like at least one CTE student to join the Wastewater Department full time for the summer of 2023, and part time for the 2023/24 school year. The additional help would allow us to catch up on IPP inspections this summer. Even during the school year, a part time employee would free up time to allow us to begin trying to implement some of the goals mentioned above. Two CTE students would be wonderful.

Andrew Warner

CHAPTER 7

CHARTS: ONE-PLUS SHIFT PLANT

The charts on the following pages apply to publicly and privately owned wastewater treatment facilities where operators are present for more than one shift a day, five days a week, but less than 24 hours a day, seven days a week. These plants, for example, may have one shift a day, seven days a week, or perhaps one shift a day, five days a week, supplemented by shorter shifts on weekends. To arrive at the numbers on the charts, the daily hour estimates for a task were multiplied by 320 to determine annual hours.

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**CHART 1 (One-Plus Shift)
BASIC AND ADVANCED OPERATIONS AND PROCESSES**

Process	Flow						Total Hours for Plant
	0.25-0.5 mgd	0.5-1.0 mgd	1.0-5.0 mgd	5.0-10.0 mgd	10.0-20.0 mgd	>20 mgd	
Preliminary Treatment	160	160	320	640	960	1280	160
Primary Clarification (mult. by # of units)	160	160	160	320	320	320	
Activated Sludge	640	1280	1920	1920-2560	2560-3200	7680	1280
Activated Sludge w/BNR	960	1920	2560	2880-3840	3840-7680	8960	
Rotating Biological Contactor	320	480-960	960-1920	1920	X	X	
Sequencing Batch Reactor (per tank)	320	320	320	320	320	320	
Extended Aeration (w/o primary)	800	1600	2560	X	X	X	
Extended Aeration w/BNR	1120	2240	3200	X	X	X	
Pure Oxygen Facility	X	X	X	2560-3200	3200	5760	
Pure Oxygen Facility w/BNR	X	X	X	3200-4800	4800	7680	
Trickling Filter	320	320	640	960	1280	2560	
Oxidation Ditch (w/o primary)	800	1600	2560	X	X	X	1600
Oxidation Ditch w/BNR	1120	2240	3200	X	X	X	
Aeration Lagoon	480	480	480	X	X	X	
Stabilization Pond	320	320	320	X	X	X	
Innovative Alternative Technologies	640	960	X	X	X	X	
Nitrification	80	80	160	160	320	640	80
Denitrification	80	80	160	160	320	640	
Phosphorus Removal (Biological)	80	80	160	160	320	640	

Continued on page 36

CHART 1 (One-Plus Shift) *continued*
BASIC AND ADVANCED OPERATIONS AND PROCESSES

Process	Flow						Total Hours for Plant
	0.25-0.5 mgd	0.5-1.0 mgd	1.0-5.0 mgd	5.0-10.0 mgd	10.0-20.0 mgd	>20 mgd	
Phosphorus Removal (Chemical/Physical)	80	160	320	640	960	1280	160
Membrane Processes	80	80	160	160	320	320	
Cloth Filtration	80	80	160	160	160	160	
Granular Media Filters (Carbon, sand, anthracite, garnet)	160	320	320	480	480	960	
Water Reuse	80	80	160	160	160	160	
Plant Reuse Water	32	32	32	48	80	80	
Chlorination	160	160	320	320	320	320	
Dechlorination	160	160	320	320	320	320	
Ultraviolet Disinfection	160	160	320	320	320	320	160
Wet Odor Control (mult. by # of systems)	160	160	320	320	320	320	
Dry Odor Control (mult. by # of systems)	80	80	160	160	160	160	
Septage Handling	160	160	320	320	320	320	160
TOTAL							2320

- Activated Sludge process includes RAS and WAS pumping.
- Secondary Clarification has been built into basic operations processes.

**CHART 2 (One-Plus Shift)
MAINTENANCE**

Activity	Flow						Multiply by	Total Hours for Plant
	0.25-0.5 mgd	0.5-1.0 mgd	1.0-5.0 mgd	5.0-10.0 mgd	10.0-20.0 mgd	>20 mgd		
Manually Cleaned Screens	80	80	80	80	160	320	# of screens ¹	80
Mechanically Cleaned Screens	80	80	80	320	960	1280	# of screens ¹	80
Mechanically Cleaned Screens with grinders/washer/compactors	80	160	320	640	1280	1600	# of screens	
Comminutors/Macerators	80	80	80	160	240	320	# of units	
Aerated Grit Chambers	32	32	80	160	240	320	# of chambers	
Vortex Grit Removal	32	32	80	160	240	320	# of units	32
Gravity Grit Removal	32	32	48	64	80	160	# of units	
Additional Process Tanks	32	32	32	32	32	32	# of tanks	
Chemical Addition (varying dependent upon degree of treatment)	32	32	32	32-96	96-192	256	# of chemicals added for processes	
Circular Clarifiers	80	80	160	160	240	320	# of clarifiers ²	160
Chain and Flight Clarifiers	80	80	160	160	240	320	# of clarifiers	
Traveling Bridge Clarifiers	X	X	X	X	240	320	# of clarifiers	
Squirrel Clarifiers	80	80	160	160	240	320	# of clarifiers	
Pumps	100	100	250	500	750	1500	X	100
Rotating Biological Contactor	48	48	80	80	X	X	# of trains	
Trickling Filters	48	48	48	80	128	160	# of TFs	
Sequencing Batch Reactor	48	48	48	80	128	160	# of tanks	
Mechanical Mixers	32	32	32	32	48	64	# of mixers	32
Aeration Blowers	64	64	64	64	96	128	# of blowers	64
Membrane Bioreactor	32	32	32	64	96	128	# of cartridges	

Continued on page 38

CHART 2 (One-Plus Shift) *continued*
MAINTENANCE

Activity	Flow						Multiply by	Total Hours for Plant
	0.25-0.5 mgd	0.5-1.0 mgd	1.0-5.0 mgd	5.0-10.0 mgd	10.0-20.0 mgd	>20 mgd		
Subsurface Disposal System	32	32	32	32	96	128	# of systems	
Groundwater Discharge	32	32	32	32	48	64	X	
Aerobic Digestion	32	32	32	32	48	64	# of digesters	
Anaerobic Digestion	X	64	64	96	192	320	# of digesters	
Gravity Thickening	32	32	32	32	96	128	# of basins	32
Gravity Belt Thickening	48	48	48	80	128	160	# of belts	
Belt Press	48	48	48	80	128	160	# of presses	
Mechanical Dewatering (Plate Frame and Centrifuges)	48	48	48	80	128	160	# of units	48
Dissolved Air Floatation	X	32	32	32	96	128	# of units	
Chlorination (gas)	32	32	32	64	96	128	X	
Chlorination (liq.)	64	64	64	96	144	192	X	
Dechlorination (gas)	32	32	32	64	96	128	X	
Dechlorination (liq.)	64	64	64	96	144	192	X	
Ultraviolet	32	32	32	48	80	96	# of racks	32
Biofilter	160	160	160	160	160	160	# of units	
Activated Carbon	160	160	160	240	240	320	# of units	
Wet Scrubbers	X	X	X	48	80	96	# of units	
Microscreens	32	32	32	48	80	96	# of screens	
Pure Oxygen	X	X	X	64	96	128	# of units	
Final Sand Filters	64	64	64	64	96	192	# of units	
Probes/ Instrumentation/ Calibration	32	32	32	32	32	32	# of probes in-line	32
TOTAL								660

**CHART 3 (One-Plus Shift)
LABORATORY OPERATIONS**

Test Required by Permit	How often are tests run?			Annual Hours
	Testing Time (hrs.)	Tested Weekly X 52	Tested Monthly X 12	
Acidity	0.75			
Alkalinity, total	0.75			
Biochemical Oxygen Demand (BOD)	2.5	Daily		
Chemical Oxygen Demand (COD)	2.5	X		
Chloride	0.5			
Chlorine, Total Residual	0.25			
Coliform, Total, Fecal, E.Coli	1.0	Daily		
Dissolved Oxygen (DO)	0.25	Daily 2X		
Hydrogen Ion (pH)	0.25	2X Daily		
Metals	3.0			
Toxicity	2.0			
Ammonia	2.0	X		
Total Nitrogen	2.0			
Oil and Grease	3.0			
Total and Dissolved Phosphorus	2.0	5X week Daily		
Solids, Total, Dissolved, and Suspended	3.0	Daily		
Specific Conductance	0.25			
Sulfate	1.0			
Surfactants	1.0			
Temperature	0.25			
Total Organic Carbon (TOC)	0.25			
Turbidity	0.25			
Bacteriological Enterococci	1.0			
Lab QA/QC Program	1.0	5X week		
Process Control Testing	3.0			
Sampling for Contracted Lab Services	0.25			X
Sampling for Monitoring Groundwater Wells	0.5			
TOTAL				1174

• Sampling time is built into testing time estimates. We spend ~ 1174 hrs/year on or regular labs

**CHART 4 (One-Plus Shift)
BIOSOLIDS/SLUDGE HANDLING**

Process	Flow					
	0.25-0.5 mgd	0.5-1.0 mgd	1.0-5.0 mgd	5.0-10.0 mgd	10.0-20.0 mgd	>20 mgd
Belt Press	320	960	1920	2560	2560	2560/shift
Plate & Frame Press	320	480	960	2560	2560	2560
Gravity Thickening	80	80	160	160	320	320
Gravity Belt Thickening	80	80	160	160	320	640
Rotary Press	80	80	160	160	320	640
Dissolved Air Floatation	X	160	160	320	320	320
Alkaline Stabilization	80	80	80	80	80	80
Aerobic Digestion	160	160	160	320	480	640
Anaerobic Digestion	80	80	160	480	800	1280
Centrifuges	320	320	960	2560	2560	2560
Composting	320	640-960	1280	2560	2560	2560/shift
Incineration	X	X	X	X	7680	7680
Air Drying – Sand Beds	160	1/2 160	X	X	X	X
Land Application	80	160	160	X	X	X
Transported Off-Site for Disposal	80	1/2 320	1280	2560	2560	2560
Static Dewatering	320	320	X	X	X	X
TOTAL		400				

**CHART 5 (One-Plus Shift)
YARDWORK**

Work Done	Size of Plant			Total Hours for Plant
	Small	Average	Large	
Janitorial/Custodial Staff	100	200	400	100
Snow Removal	60	120	400	60
Mowing	100	120	400	100
Vehicle Maintenance (per vehicle)	25	25	25	50
Facility Painting	60	80	160	60
Rust Removal	60	80	160	60
TOTAL				430

**CHART 6 (One-Plus Shift)
AUTOMATION/SCADA**

Type of Automation	Yes	No
Automated attendant or Interactive voice recognition (IVR) equipment		X
Automated Meter Reading (AMR), Touchpad meters or other automated metering technology	X	
Automatic call director (ACD)		X
Billing system		X
Computerized facilities management (FM) system		X
Computerized preventative maintenance	X	
Computerized recordkeeping	X	X
E-mail	X	
Geographical information system (GIS)		X
Integrated purchasing and inventory		X
Internet website		X
Laboratory information management system (LIMS)		X
Local area network (LAN)		X
Supervisory control and data acquisition (SCADA)	X	
Telemetry	X	
Utility customer information system (CIS) package		X

**CHART 7 (One-Plus Shift)
CONSIDERATIONS FOR ADDITIONAL PLANT STAFFING**

<ul style="list-style-type: none"> • Management responsibilities (i.e., human resources, budgeting, outreach, training, town/city meetings, scheduling, etc.) and responsibility for clerical duties (i.e., <u>billing</u>, <u>reports</u>, <u>correspondence</u>, <u>phones</u>, <u>time sheets</u>, <u>mailings</u>, etc.) 	<u>Yes</u>
<ul style="list-style-type: none"> • Plant staff responsible for collection system operation and maintenance, <u>pump station inspections</u>, and/or combined sewer overflows 	<u>Yes</u>
<ul style="list-style-type: none"> • Plant operators responsible for snow plowing, road/sidewalk repair, or other municipal project 	<u>No</u>
<ul style="list-style-type: none"> • Plant staff involved in generating additional energy 	<u>No</u>
<ul style="list-style-type: none"> • Plant receives an extra high septage and/or grease load (higher than designed organic and grease loadings) or plant takes in sludge from other treatment plants 	<u>Yes</u> <u>Landfill</u>
<ul style="list-style-type: none"> • Plant is producing a Class A Biosolid product 	<u>No</u>
<ul style="list-style-type: none"> • Plant operators responsible for operating generators and emergency power 	<u>Yes</u>
<ul style="list-style-type: none"> • Plant responsible for industrial pre-treatment program 	<u>Yes</u>
<ul style="list-style-type: none"> • Plant staff responsible for plant upgrades and large projects done both on-site and off-site (i.e., collection systems, manholes, etc.) 	<u>?</u>
<ul style="list-style-type: none"> • Plant operators responsible for machining parts on-site 	<u>No</u>
<ul style="list-style-type: none"> • Age of plant and equipment (over 15 years of age) 	<u>No</u>



THE NORTHEAST GUIDE FOR ESTIMATING STAFFING AT PUBLICLY AND PRIVATELY OWNED WASTEWATER TREATMENT PLANTS (One-Plus Shift)

Plant Name: Buchanan WWTP
 Design Flow: 1.33 Million Gal Actual Flow: ~0.9 million Gal

FINAL ESTIMATES	
Chart #	Annual Hours
1 – Basic and Advanced Operations and Processes	2320
2 – Maintenance	660
3 – Laboratory Operations	1174
4 – Biosolids/Sludge Handling	400
5 – Yardwork	430
Estimated Operation and Maintenance Hours	4984
Estimated Operation and Maintenance Staff	3.32
Estimated Additional Staff from Chart 7	1
Total Staffing Estimate	4.32

• Divide the total of Annual Hours by 1500 hours per year to get the Estimated Operation and Maintenance Staff needed to operate the plant. This assumes 5-day work week; 29 days of vacation, sick leave, holidays; and 6.5 hours per day of productive work.

Note: The estimate from Charts 1-5 will not be the final amount of staff necessary to run the facility. Please review Chart 7 for additional staffing needs.

Chart 6 – Automation/SCADA (List all “yes” answers from Chart 6.)

Chart 7 – Considerations for Additional Plant Staffing (List all “yes” answers from Chart 7.) Attach supporting information to justify additional staffing needs from Chart 7.