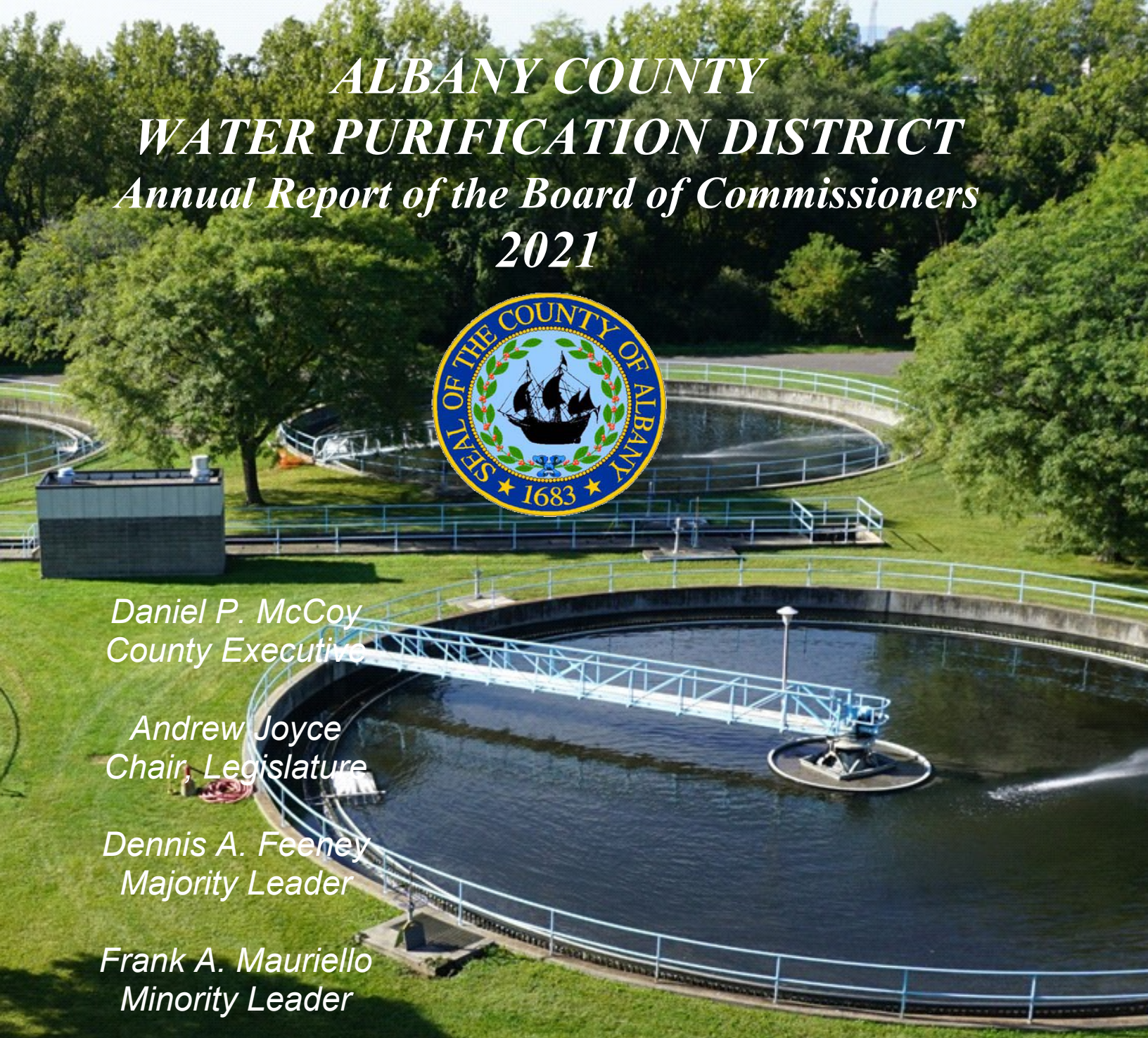
ALBANY COUNTY
WATER PURIFICATION DISTRICT
Annual Report of the Board of Commissioners
2021



Daniel P. McCoy
County Executive

Andrew Joyce
Chair, Legislature

Dennis A. Feeney
Majority Leader

Frank A. Mauriello
Minority Leader

Board of Commissioners
John R. Adair, Jr., Chairman
Hon. John W. Bishop, Jr.
Hon. Nicholas W. Foglia
Dennis Rigosu
Hon. Sean E. Ward

Angelo S. Gaudio
Executive Director

Board of Commissioners

left to right , Hon. John W. Bishop, Jr., Hon. Sean E. Ward, Dennis Rigosu, Chairman, John R. Adair, Jr., Hon. Nicholas W. Foglia

"Albany County does not discriminate on the basis of race, religion, color, national origin, gender, age, gender identity or expression, sexual orientation, disability, genetic information, veteran status or marital status in its programs, employment and activities."

Dedication

From left to right; Superintendent, Tyler Masick, Commissioner Dennis Roguso, Chairman of the Albany County Legislature, Andrew Joyce, former Executive Director, Richard Lyons, Chairman Adair, former Executive Director, Timothy Murphy, Commissioner, Sean Ward, and Executive Director Angelo Gaudio

After 26 years of dedicated service to the Albany County Water Purification District, Chairman John R. Adair Jr. has resigned from the Board of Commissioners.

Chairman Adair has been a Board member since 1995 and has served as Chairman since 1996.

During his tenure as Chairman, he has led the District through $33.9 million dollars of capital improvements.

It is with great honor that the District dedicates this annual report to Chairman Adair.

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INTRODUCTION

The Albany County Water Purification District owns and operates two wastewater treatment facilities, designated North and South, which provide secondary treatment to the wastewater of eight communities in Albany County. The North plant is located in the Village of Menands and designed to treat an average daily flow of 35 MGD. The South plant is located in the Port of Albany and was designed for 19MGD and is permitted for 29 MGD.

The North plant treats wastewater from the Cities of Cohoes, Watervliet and a portion of Albany as well as the Towns of Guilderland and Colonie and the Villages of Colonie, Green Island and Menands. The South plant treats wastewater from approximately 90% of City of Albany and the Port of Albany.

All Significant Industrial Users discharging through the communities' collection systems are permitted as part of the USEPA approved Pretreatment Program. Where necessary the District requires pretreatment prior discharging their wastewater.

This annual report presents the performance of the Water Purification District for the year 2020 pertaining to Operation, Maintenance, Sewer Use and related topics. Data is presented in tabular form, charts and figures wherever possible. The data clearly shows that from an overall standpoint, the District's performance was effective and efficient during the year.

HIGHLIGHTS

CAPITAL PROJECTS

1. South Plant Headworks Improvements

The District has entered into an agreement with the City of Albany to improve the headworks of the treatment plant to handle screens from the Lincoln Park Long Term Control Plan project. Plans to replace the three screens, washer and dry for screening, dumpster truck, dumpsters, and four primary pumps ball checks are scheduled for design and construction in 2021 and completion in 2022.

2. North Plant Boiler Replacement

The District completed the replacement of the main plant boiler located in the solids building north plant. Cost of the boiler was $180,000, with engineering and installation costs of $500,000.

STAFFING

The staffing of the District allows most of the workload to be handled in house. The primary reason for this self-sufficiency is due to the separation of departments into Administration, Process Operation, Maintenance, and Laboratory. These individual departments promote professional expertise in many areas. The responsibilities of each department within the District are as follows:

Administration - This department is responsible for overall administration of the District including fiscal aspects, personnel, operation and maintenance.

Process Operation - The operation of all processes and unit operations within each plant are carried out by the process operating staff. Process equipment must perform as efficiently as possible, especially in the solids handling sector, to minimize plant-operating costs while maximizing pollutant removals. Process Operation is also responsible for most routine maintenance and cleanup activities, including grounds keeping.

Training of process operators and our plant safety program is also included under this department. The importance of training and safety cannot be overstated. Training operators to fill vacant process positions and the safety of all our employees benefit the overall operation and cut loss time accidents while eliminating potential safety hazards.

Maintenance - Both major and preventative maintenance of all mechanical, instrument and electrical equipment is the responsibility of the maintenance department. All maintenance functions for both plants fall under

the responsibility of the Chiefs of Maintenance and Instrumentation. The responsibilities of this department are as follows: Maintenance of all mechanical equipment, snow removal, vehicle maintenance, instrumentation, metering pits, incinerator control systems, and electrical maintenance with the exception of high voltage systems.

Wastewater Management - This department provides wastewater management including input on SPDES and air permit issues and administers the industrial waste control and pre-treatment programs and the laboratory, which is State certified, and runs all of the analytical tests necessary for process control within the plant and reporting to the regulatory agencies. A sewer maintenance crew within this department insures that all dry weather wastewater flow reaches the plants for treatment and carries out the maintenance of all regulators under District control.

Major in-house Projects of 2021

North Plant Maintenance

- Cross Collector number 1 rebuild
- Rebuild Vogelsang Combine Pumps numbers 1 and 3
- Rebuild Borger Combine pump
- New bearings and seals in West Belt Press
- Replace number 1 Bar Screen motor
- Install new Dorr-Oliver
- Replace eight bearings on West Press
- Rebuilt Primary Tank number 3

South Plant Maintenance

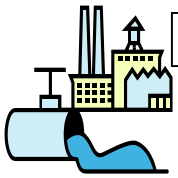
- Replace new bearings and gears on Primary Tank 2
- Replace new stators on poly transfer
- Replace drive motor on Final Clarifier 2
- Rebuilt two Primary Tank cross collectors
- Rebuilt number 2 Grit Chamber

ALBANY COUNTY WATER PURIFICATION DISTRICT
ORGANIZATIONAL FLOW CHART

Albany County Legislature

Board of Commissioners

Executive Director



Superintendent of Operations

Administration
Project Developer
Business Office Manager
Administrative Aid

North Plant Process
Chief Process Operator (1)
Process Operator III (4)
Process Operator II (10)
Process Operator I (4)
Laborer (3)

South Plant Process
Chief Process Operator (1)
Process Operator III (4)
Process Operator II (10)
Process Operator I (3)
Laborer Sub-Foreman (1)
Laborer (2)

Instrumentation
Senior Instrument Technician (1)
Electrician (1)

Wastewater Management
Permit Compliance Manager (1)
Permit Compliance Technician (1)
Senior Laboratory Technician
Laboratory Technician (2)
Collection Systems Maintenance Foreman (1)
Collection Systems Maintenance Mechanic (1)
Collection Systems Maintenance Assistant (1)
Process Operator I (1)

North Plant Maintenance
Chief of Maintenance (1)
Maintenance Mechanic III (1)
Maintenance Mechanic II (4)
Maintenance Mechanic I (1)
Mechanic Specialist (1)
Mechanic Specialist HVAC (1)
Automotive Mechanic (1)
Maintenance Control Mechanic (1)

South Plant Maintenance
Maintenance Mechanic III (1)
Maintenance Mechanic II (2)
Maintenance Mechanic I (1)

PROCESS OPERATION

Both plants are virtually identical, from a process standpoint. Figure 1 on page 10 shows the general process units and flow pattern for the facilities. The purpose of each type of treatment is as follows:

A. **Preliminary Treatment** - Removes large material through screening and grit through grit chambers from the raw wastewater which could clog pipelines and damage mechanical equipment in downstream processes.

Grit Chamber

B. **Primary Treatment** - This is a physical process of gravity settling which removes settleable solids in the form of primary sludge. Grease and scum are also removed, since they would interfere with subsequent processes and sludge dewatering. Primary treatment removes approximately 25-35% of the biochemical oxygen demand (BOD) in wastewater and 40-60% of the suspended solids in the wastewater.

Primary Tanks

B. **Secondary Treatment** - This is a biological process which uses microorganisms to remove 85-95% of the remaining suspended solids and BOD prior to discharge to the Hudson River. Waste activated sludge is generated in

this process and is mixed with primary sludge to form a combined sludge that is dewatered and incinerated.

Aeration Tank

Final Clarifier

C. **Disinfection** - Disinfection is practiced seasonally (May 1 to October 31) for the protection of public health and the improvement of water quality in the Hudson River during the recreational season. Disinfection was reinstituted in the summer of 2015 as required in the District's SPDES permit at both treatment

plants. The North plant employs disinfection using Sodium Hypochlorite with dechlorination using Sodium Bisulfite. The South plant employs Ultraviolet lamp disinfection process.

Outfall

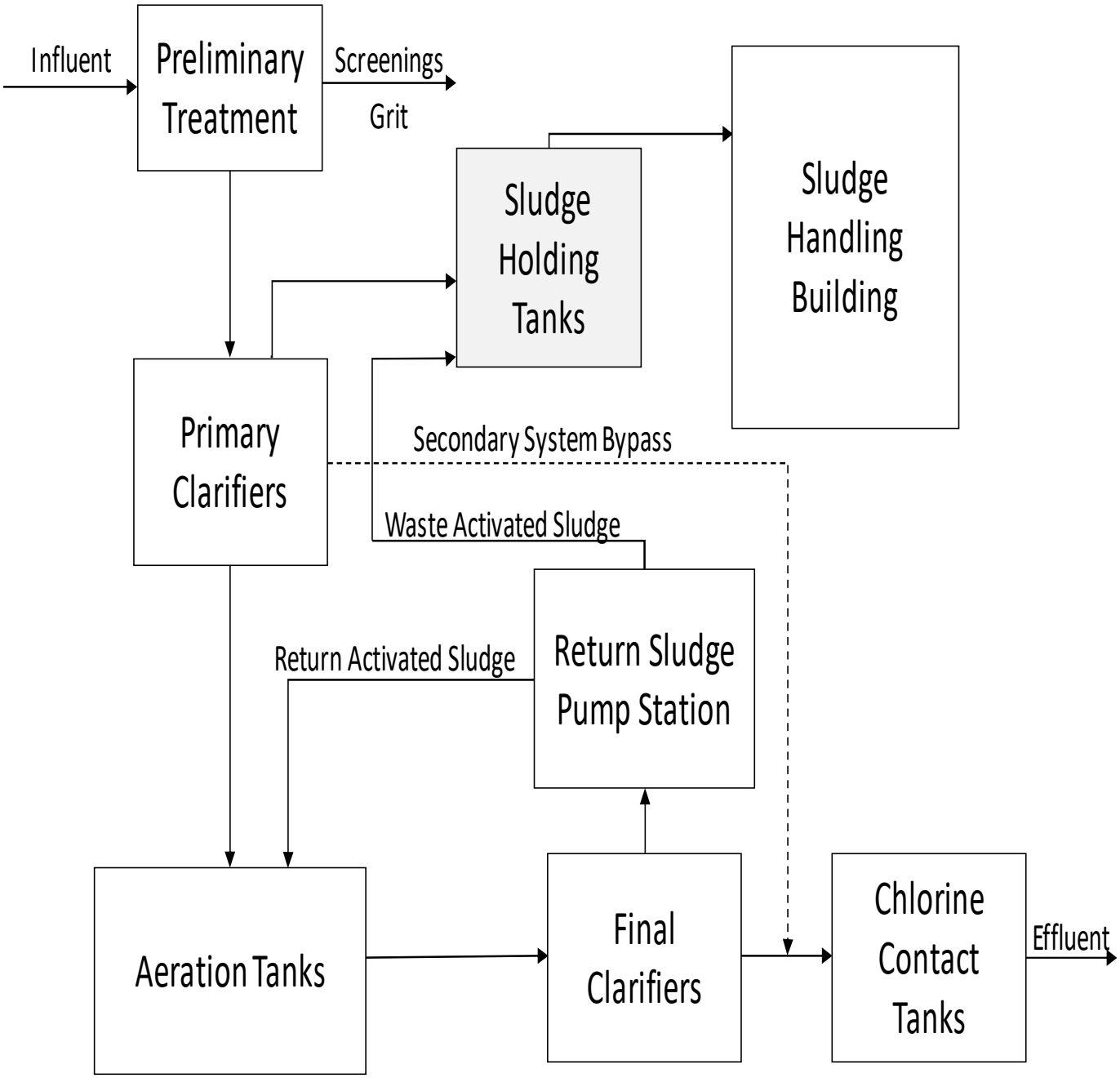


Figure 1. Wastewater Flow Schematic

PROCESS PERFORMANCE

The performance of the process operation at the District's facilities is gauged on the removal efficiencies of the plant units which treat the incoming raw wastewater, and the effectiveness of the solids handling operations which treat and dispose of the sludge produced. In addition, the overall process performance is gauged from a cost standpoint.

Table 1 and 1A shows the removal efficiencies for standard pollutants removed from the wastewater treatment units. A review of the Tables show that effluents from both District plants were well within permit requirements for BOD, Suspended Solids, TKN and Fecal Coliform. This data reflects the type of effluent, which can be obtained from larger plants which practice both good process control and good sludge-handling techniques.

A brief definition of the parameters contained in Tables 1 and 1A are listed below:

A. **BOD (Biochemical Oxygen Demand)** - The amount of oxygen (mg/l) required in five days to oxidize the biodegradable organic matter in a sample at 20 degrees C.

B. **S.S. (Suspended Solids)** - The non-settleable residue in a sample which is retained on a fine fiber filter (1 micron in size) measured in mg/l.

C. **NH3 (Ammonia Nitrogen)** - The ammonia in a sample measured in mg/l.

D. **TKN (Total Kjeldahl Nitrogen)** - The total of the ammonia plus the organic nitrogen in a sample measured in mg/l.

E. **Fecal Coliform -** The disinfection process is used to kill or inactivate microorganisms in the wastewater to meet established water quality standards.

TABLE 1
PROCESS PERFORMANCE DATA - 2021
NORTH PLANT

Parameter	Influent (mg/l)	Effluent (mg/l)	Discharge Permit Limit (mg/l)	Efficiency %	Tons Removed Per Day	Tons Discharged Per Day
BOD	181	4.9	25.0	97.3	14.83	0.42
S.S.	240	10.2	30.0	95.8	19.36	0.86
NH_3	18.2	8.7	NA	52.2	0.80	0.73
TKN	32.5	7.1	15.2*	78.1	2.14	0.60
Fecal Coliform		52	**200 colonies Per 100 ml ****			

Average Flow -20.53 MGD

*Seasonal June 1 to October 31
** Seasonal May 1 to October 31

TABLE 1A
PROCESS PERFORMANCE DATA - 2021
SOUTH PLANT

Parameter	Influent (mg/l)	Effluent (mg/l)	Discharge Permit Limit (mg/l)	Efficiency %	Tons Removed Per Day	Tons Discharged Per Day
BOD	77	3.6	25.0	95.3	6.85	0.34
S.S.	103	8.8	30.0	91.5	8.75	0.82
NH_3	8.9	1.0	NA	88.8	0.74	0.09
TKN	15.9	1.4	15.4*	91.5	1.35	0.13
Fecal Coliform		61	**200 colonies Per 100 ml ****			

Average Flow – 22.27 MGD

*Seasonal June 1 to October 31
**Seasonal May 1 to October 31

SOLIDS HANDLING

Sludge thickening and dewatering processes are identical at both plants and are contained in a Solids Handling Building at each facility. Figure 2 on page 16 shows the units, which make up the solids handling processes and operations at the District. The solids handling flow schematic and operations are described as follows:

A. Flotation Thickeners - Waste activated sludge (0.3 - 1.0% solids) is thickened by the use of dissolved air flotation units to 4.0 - 7.0% solids.

B. Sludge Holding Tanks - Primary and thickened waste activated sludge is mixed and stored in holding tanks prior to dewatering.

C. Belt Filter Presses - The combined sludge (primary and thickened waste activated) is pumped from the holding tanks and chemically conditioned with International Dioxide Endimal for odor control and polymer for coagulation and flocculation prior to being dewatered on a belt press. The belt press dewaters the sludge to a fairly dry cake (20 - 30% solids).

Two-Meter Belt Filter Press

D. Incineration - The cake formed by the dewatered sludge on the belt filter press is next incinerated in a multiple hearth incinerator. The resulting ash from the incineration process is then stored in lagoons prior to ultimate disposal at a landfill site. Between the two plants the District generates approx. 9,000 to 13,000 cubic yards of ash annually. The District maintains a Beneficial Use Determination for the ash.

SOLIDS HANDLING PERFORMANCE

Tables 2 and 3 show the solids handling performance data for the North and South Plant sludge thickening and dewatering equipment respectively. The data is in two parts. To the left of the slash is 2021 data and to the right of the slash is a five-year average of solids handling performance. Using a five-year average of chemical dosages and sludge cake percent solids gives a better insight into actual solids handling performance since variations from year to year and plant to plant are dependent on many variables affecting treatment and costs.

Chemical dosage at the North Plant for polymer decreased 6.6% compared to the five-year average and the oxidant decreased 24.7%, compared to the five-year average.

Chemical dosage at the South Plant for polymer decreased 2.9% compared to the five-year average and the oxidant increased .5%, compared to the five-year average. The North Plant experienced a increase in cake percent solids of 2.0% and the South Plant a increase of 10.8% compared to the five-year average.

Increase or decrease in the amount of oxidant is dictated by the amount of sulfides released by the combined sludge during processing. International Dioxide Endimal oxidizes the hydrogen sulfide which is a very corrosive gas attacking ferrous metals and concrete. The New York State Department of Labor has set a limit of ten parts per million to protect worker health and safety.

The data in Tables 2 and 3 indicates that the solids handling units operate at high efficiencies. High efficiencies are important since the wastewaters produced by these units are returned to the head of the plant for treatment. If a high concentration of solids and/or B.O.D. were returned, the result would be higher treatment costs.

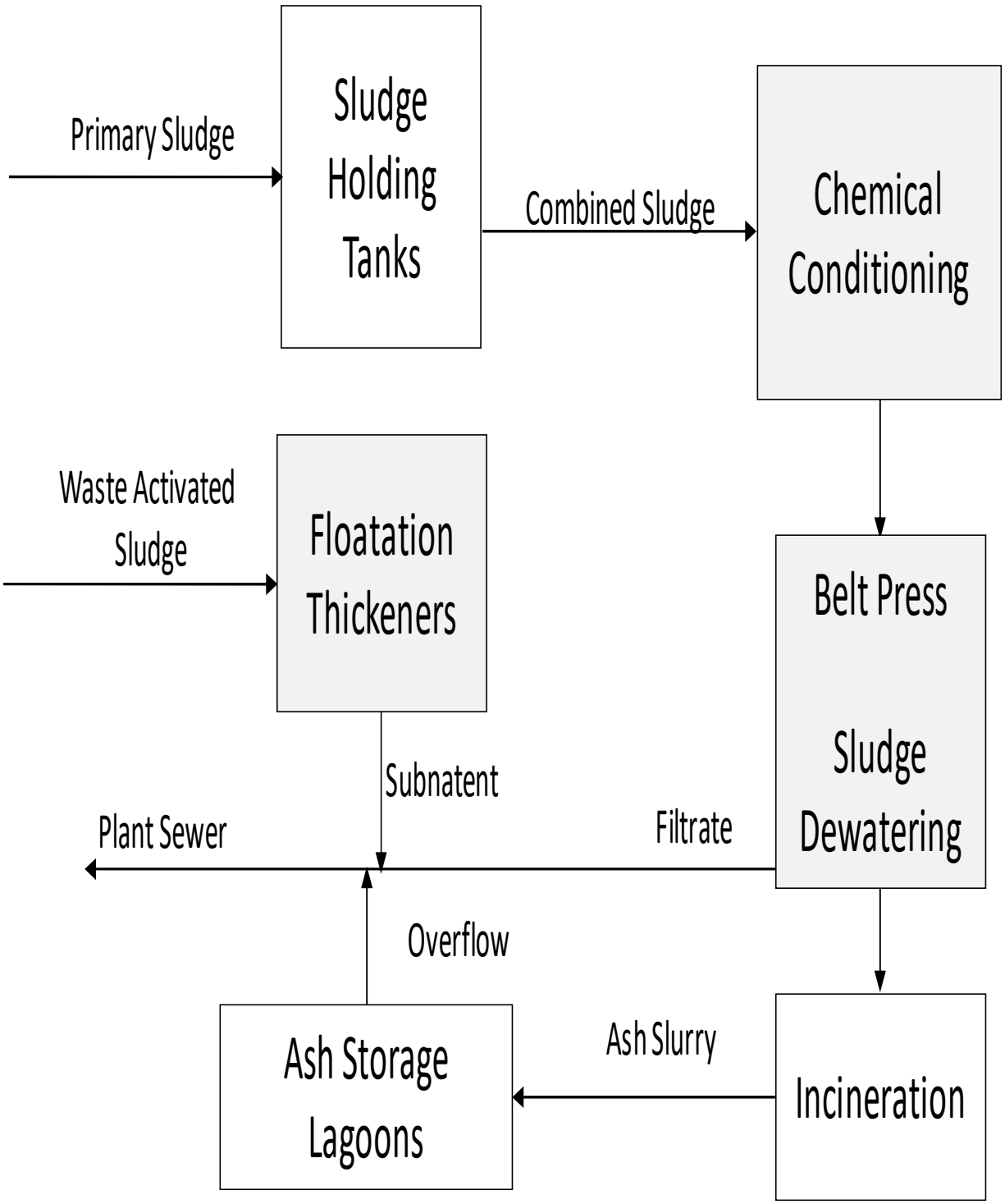


Figure 2. Solids Handling Schematic

Table 2

NORTH PLANT

Flotation Thickeners

Parameter	Feed (Influent) (mg/l)	Overflow (to plant sewer) (mg/l)	% Efficiency	Thickened Sludge Solids %	Chemical Dosage (Polymer) %
Suspended Solids	4,192/4,647	154/272	96.3/94.1	5.1/4.8	7.7/9.7

Belt Filter Press

Parameter	Combined Sludge Feed (mg/l)	Filtrate (to plant sewer) (mg/l)	% Efficiency	Dewatered Sludge Solids %	Polymer #/Dry Ton Oxidant #/Dry Ton
Suspended Solids	34,682/34,212	873/424	97.5/98.8	24.4/23.9	125.5/134.4 12.8/17.0

Numbers to the left of the slash mark are 2021 figures; numbers to the right indicate a five-year average 2016-2020

Table 3

Solids Handling Performance Data

SOUTH PLANT

Flotation Thickeners

Parameter	Feed (Influent) (mg/l)	Overflow (to plant sewer) (mg/l)	% Efficiency	Thickened Sludge Solids %	Chemical Dosage (Polymer) %
Suspended Solids	5,017/5,696	10/53	99.8/99.1	5.2/4.8	3.7/2.7

Belt Filter Press

Parameter	Combined Sludge Feed (mg/l)	Filtrate (to plant sewer) (mg/l)	% Efficiency	Dewatered Sludge Solids %	Polymer #/Dry Ton Oxidant #/Dry Ton
Suspended Solids	36,309/28,209	494/443	98.6/98.4	25.9/23.1	135.1/139.2 17.5/17.4

Numbers to the left of the slash mark are 2021 figures; numbers to the right indicate a five-year average 2016-2020

SOLIDS HANDLING AND PLANT OPERATING COSTS

The overall usage, cost, and cost per dry ton of solids handling for chemicals, labor, power and fuel energy requirements for the dewatering and disposal of sludge at each plant are shown in Table 4. The contributing factors are varied and reflect the cost of the raw materials needed to process the sludge and the amount and quality of sludge produced at each plant. Generally speaking, the more sludge processed the higher the overall cost, but will reflect a lower cost per dry ton of solids handled.

The total costs for solids handling increased $561,469 North and increased $301,232 South as compared to 2020. In 2021 the total revenues received from the scavenger waste, sewage sludge and the South Plant gray water sales were $2,933,868.91. These revenues defray costs to the member communities by applying the monies to the O&M budget and paying for capital projects with cash in lieu of financing, so as not to increase debt service.

The total cost per dry ton processed decreased 12.3%, North and decreased 3.0% at the South Plant compared to 2020 figures. A increase in the amount of sludge processed of 22.6% North and an increase of 4.0% at the South Plant, contributed to these costs as mentioned above.

The plant operating costs, which are contained in Table 5, represent the overall operation and maintenance expenditures for each plant during 2020. This category includes all costs associated with sewage treatment except debt service and administration costs. Power, fuel energy, chemical and maintenance and miscellaneous costs rise and fall from year to year depending on the amount of sludge and wastewater processed and the cost of raw materials associated with solids handling. Generally, the more sludge processed during a given year the higher the cost associated with these items.

The total operating costs increased 9.2% North and 7.1% South as compared to 2020 figures. The combined plant operating costs increased $844,406 or 8.3% as compared to 2020.

Table 4

2021 SOLIDS HANDLING COSTS

	North Plant	South Plant
Dry Solids Incinerated (tons)	7,859.7	3,009.3
Fuel Energy Requirement (thermal units)	366,434	275,216
Polymer Used (tons)	493.0	203.3
Siemens Tech. VX-456 Oxidant Used (tons)	50.2	26.3
Man-Hours	22,466	13,312
Fuel Energy Requirements	$ 258,183	$ 186,956
Chemical Costs	$ 203,349	$ 92,779
Manpower Costs	$ 802,036	$ 475,238
Power Costs	$ 136,708	$ 105,312
TOTAL COSTS	**$ 1,797,580**	**$ 1,152,052**

Cost Per Dry Ton Solids Handled	North Plant	South Plant
Fuel Energy	$ 32.85	$ 62.13
Chemical	$ 25.87	$ 30.83
Labor	$ 102.04	$ 157.92
Power	$ 17.39	$ 34.99
TOTAL	**$ 178.16**	**$ 285.87**

Table 5

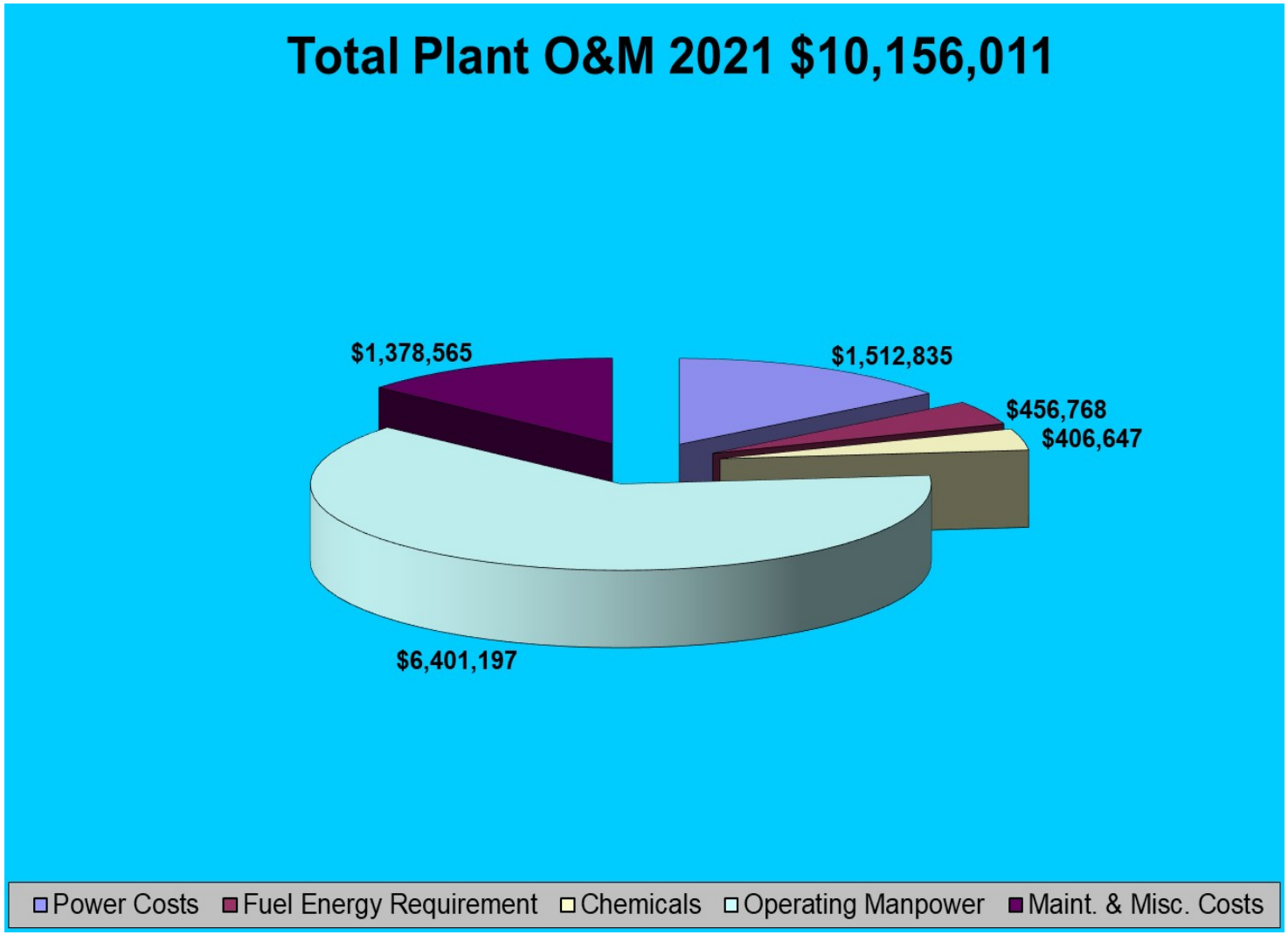
Plant Operating Costs - January 1, 2021 through December 31, 2021

	North Plant	* % Change	South Plant	* % Change
Dry Solids Removed (tons)	7,859.7	+29.3	3,009.3	-7.1
Volume Treated (millions of gallons)	7,386	+4.2	8,130	+9.7
Lb. BOD Removed Per Day	29,656	-4.6	13,698	+16.0
Power Cost	$852,755	+45.8	$660,080	+42.9
Fuel Energy Requirement (natural gas)	$244,502	+47.5	$212,266	+7.8
Chemical Cost	$303874	+22.3	$102,773	+8.2
Operating Manpower	$3,520,658	+10.2	$2,880,539	+10.2
Maint. & Misc. Costs	$758,211	-21.3	$620,354	-21.3
TOTAL PLANT OPERATING COSTS	$5,680,000	+10.2	$4,476,011	+7.7
Cost Per 1,000 Gallons Treated	$0.77	+5.7	$0.55	-1.8
Overall Cost/Ton Dry Solids Removed	$722.68	-14.8	$1,487.37	+3.3
Cost Per lb. BOD Removed	$0.52	+15.5	$0.90	-7.1

***Compared to 2019**

TOTAL PLANT OPERATING & MAINTENANCE COSTS

Year	Total Costs
2021	$10,156,011
2020	$9,311,605
2019	$ 9,624,121
2018	$8,411,326
2017	$9,728,494
2016	$8,830,223
2015	$ 9,341,879
2014	$ 9,517,155
2013	$ 8,428,004
2012	$ 8,050,342


Total Plant O&M 2021 $10,156,011
$1,378,565
$1,512,835
$456,768
$406,647
$6,401,197
Power Costs
Fuel Energy Requirement
Chemicals
Operating Manpower
Maint. & Misc. Costs


Total Plant O&M Costs 2011 - 2021
$11,000,000
$10,000,000
$9,000,000
$8,000,000
$7,000,000
$6,000,000
$5,000,000
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021

REGULATION OF SEWER USE

In accordance with the USEPA's Federal Pretreatment Requirements (40 CFR Part 403), during 2021 the Albany County Water Purification District's approved Pretreatment Program's sampling and analysis program was continued. In addition, Industrial user visitations and impromptu inspections were conducted by the District's Permit Compliance Manager and the Permit Compliance Technician. In addition to the review of self-monitoring required of all permitted industrial users, the District sampled all industrial users in 2021 to ensure continued compliance with permit limitations.

Pursuant to Federal requirements 40 CFR Part 403, the Albany County Water Purification District is required to report instances of SNC (Significant Non-Compliance) with the USEPA Pretreatment Standards and/or Requirements and/or the Districts Sewer Use Ordinance during 2021. Minor permit violations were handled by issuing either a NOV (Notice Of Violation) or an Administrative Directive, in accordance with the District's federally approved enforcement response plan. There were no instances of SNC for 2021.

The District continued to evaluate the need to permit additional industrial users throughout 2021. No additional permitted industrial users were identified in 2021.

Collection System

The District's collections system crew aided the member communities in the removal of nine (9) regulators in the City of Cohoes, Village of Green Island, and the City of Watervliet. This project was part of the newly implemented Inspection and Maintenance Program (IMP). The District continues to inspect and clean the remaining regulator structures, and is aiding the member communities in satisfying the requirements of the newly implemented IMP. The District aided in the cleaning of Vortex Units located on Schoolhouse Road and Fuller Road, in an effort to prevent flooding during storm events.

SAFETY

The goal of the Sewer District is to give its employees the safest work environment possible. To reach this goal the District has implemented many procedures, which protect the employee's health and safety. Lockout-tag out, confined space entry and respiratory protection procedures along with safety training and plant safety seminars have been implemented to reach this goal. Our safety officer works closely with the National Safety Council.

Our safety officer and District Safety Committee investigate each accident report filed by any employee and any unsafe condition is rectified to remove the safety hazard.

The District's safety committee meets bi-monthly with representatives from each department. The District holds Hazardous Communication meetings annually for all employees to go over all safety programs. The District continues to have representation on the countywide Safety Committee, which is evaluating all county safety, health and training issues.

Total lost time accounted for 5 man-days. The total lost time was a decrease of 145 days as compared to 2020. The District continues to evaluate all equipment and procedures so that the safest work environment is provided to all employees. In cooperation with County Human Resources, the District also takes a pro-active stance investigating all injury claims for legitimacy and validity.

In 2021, Covid-19 limited the Albany County Code Enforcement inspections and the District facilities were not inspected however, all safety protocols were maintained throughout both facilities. The District was shown to be in compliance with all mandated safety programs. Internal inspections found minor safety issues that were corrected immediately by the District.

Table 6 – Accident Report 2021

Department	Type of Injury	Lost Man Days
North Plant Operating	Turning gate valve, hand slipped and hit head	0
Laboratory	Cut left hand when beaker broke	0
Maintenance	Shoveling snow, fell, hurt left rib cage	0
	While changing a bearing, hammer slipped and hit hand	3
	Left pinkie shocked when contact made on compressor	0
	Pulling on pipe wrench, pulled lower left back	2
	Total work days lost	**5**