WATER RECLAMATION FACILITIES ANNUAL SUMMARY OF OPERATIONS

GOLETA SANITARY DISTRICT WATER RECLAMATION 2020 ANNUAL REPORT

GOLETA SANITARY
Water Resource Recovery District

"Protecting Public Health and the Environment"

Submitted: January 2021

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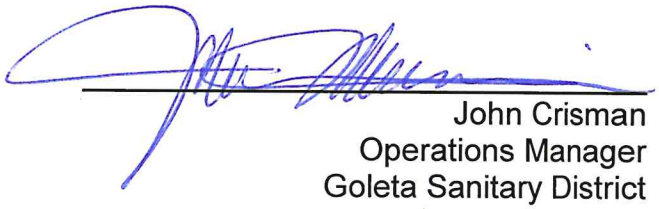

John Crisman
Operations Manager
Goleta Sanitary District

Date: January 11, 2021

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INTRODUCTION

The Goleta Sanitary District owns and operates a wastewater treatment facility located at One William Moffett Place in the unincorporated Goleta area of Santa Barbara County. In 1992, the District expanded its treatment plant to include water reclamation facilities with the capacity to treat up to 3.3 million gallons per day of secondary treated effluent to tertiary standards. Reclaimed water distribution to the Goleta community began in August 1994. Reclaimed water is available to the community for unrestricted recreational uses such as landscape irrigation. In addition to incidental uses that include construction dust control, compaction and irrigation of landscaping at the wastewater treatment plant; the reclaimed water is used in the restroom facilities at the United States Postal Service, Goleta Beach County Park and on one floor of the Bren Building at UCSB.

The Goleta Sanitary District (GSD) is responsible for the production and on-site storage of the reclaimed water. The Goleta Water District independently owns and operates a reclaimed water distribution system used to deliver the reclaimed water to the reclamation customer sites. The Goleta Water District is regulated under separate water reclamation requirements.

Goleta Sanitary District produces reclaimed water in accordance with the monitoring and reporting requirements stipulated in the California Regional Water Quality Control Board, Central Coast Region, Waste Discharge Requirements Order No. R3-2017-0021. The prior Monitoring and Reporting Program No. 91-03 was terminated on December 13, 2019 by Order No. R3-2019-099.

This annual report contains summaries of the monitoring data obtained throughout 2020 and discusses the District's compliance record regarding the operation of the reclamation facility.

FACILITY OPERATION

The wastewater treatment plant upgrade project to full secondary treatment was completed in 2013. Although the upgraded facility did not include the construction of any new reclamation facilities, full secondary treatment could allow for an expansion of the reclamation facilities in the future. The reclamation facility is designed to treat up to 3.3 million gallons per day of secondary effluent to tertiary standards.

Secondary effluent enters the reclamation facilities where a flash mixer disperses aluminum sulfate (alum) and polymer into the water. The flocculated secondary effluent is then gravity filtered through a bed of anthracite coal where the floc is removed. The filtered water then flows to a chlorine contact tank where sodium hypochlorite is added for disinfection.

The chlorinated filtered water is then stored in an underground 3 million-gallon storage tank until distribution. Reclaimed water is distributed throughout the Goleta Valley by a distribution system operated and maintained by the Goleta Water District.

FACILITY MAINTENANCE

A number of maintenance repairs were performed on the reclamation facility equipment during 2020. Repairs can be expected to increase as the facility ages. The repairs were typical of those needed for a 27 year-old treatment facility that is in operation much of the year.

The following is a list of the equipment that was repaired or replaced during 2020:

- Replaced Motor Control Center 8080 and 8081 that provide all power to the production and distribution equipment at the facility.
- Replaced the chlorine flash mixer motor and gearbox.
- Performed filter surveillance to determine the quality of the filter media and the effectiveness of the filtration process.

A facility operation and maintenance manual specifically for the reclamation facilities was supplied as part of the original project by the facility design engineers and is dated March 1993. There have been no significant changes to the operation or maintenance requirements of the facility and the manual continues to be current and valid with regards to this facility.

STAFF

Mr. Steve D. Wagner, PE, served as GSD's General Manager and District Engineer during 2020. The General Manager is responsible for overall operations and performance of the treatment plant.

Ten state certified operators, operated the reclamation facility under the direction of the Plant Operations Manager, Mr. John Crisman. Chuck Smolnikar supervises the reclamation facility's maintenance staff and the laboratory staff and laboratory operations are under the direction of Lena Cox, the Laboratory Manager. The grade and certification number of operations, maintenance, environmental compliance and laboratory personnel, employed during the 2020 operational year, are shown below in Table 1.

TABLE 1. Goleta Sanitary District Operation Staff, 2020

Staff	Grade	California Certification No.
Operators		
John Crisman	V	28857
Marc Ciarlo	V	41067
Pete Regis	IV	28277
Stephen Conklin	III	7065
Ricardo Lopez	III	10756
Francisco M. Lemus	III	10893
Morgan Lea	III	28400
Jes Hulbert	I	28266
River Ferrara	I	28488
Justin Graves	I	43450
Lab Analysts		
Lena Cox	IV	90334003
Marc Ciarlo	II	1308216989
Teresa Kistner	I	99076111
River Ferrara	I	1308214257
John Crisman	I	1308214787
Justin Graves	I	1308219530
Maintenance Technologist		
Alejandro Bautista	I	1308215066
Torrey Jones	I	1308217681
Electrical / Instrumentation		
Charles Smolnikar	II	60172004
Ramon Garza	I	1308216916
Dept. of Industrial Relations – Electrician		
Charles Smolnikar	NA	107709
Ramon Garza	NA	160174
Environmental Compliance		
Teresa Kistner	II	3014202
Biosolids Land Application Management		
Lena Cox	I	70711001

MONITORING PROGRAM

The Goleta Sanitary District monitoring and reporting program was conducted in accordance with the requirements of Order No. R3-2017-0021. Reclaimed water samples were collected by treatment plant personnel and analyses were performed for routine parameters by the Goleta Sanitary District's certified in-house laboratory. Metals and priority pollutant samples were analyzed by commercial environmental laboratories: OEC of Santa Maria, CA and the dioxin sample analysis was performed by Ceres Analytical of El Dorado Hills, CA. All samples were collected and all analyses were performed according to conditions specified in Table 2.

Analytical methodologies used by GSD, OEC and Ceres laboratories are based on approved U.S. Environmental Protection Agency (EPA) methods and other methods found in Standard Methods for the Examination of Water and Wastewater.

TABLE 2. Reclaimed Water Sampling Plan

Parameter	Frequency	Analytical Lab	Sample Type	Standard Method
Turbidity	Continuous	GSD	Metered	2130 B.
Chlorine Residual	Continuous	GSD	Metered	4500-Cl G.
Total Coliform	Daily	GSD	Grab	9223 B.
pH	Daily	GSD	Grab	4500-H+ B.
BOD	Monthly	GSD	24 hr Comp	5210 B.
TSS	5 days/week	GSD	24 hr Comp	2540 D.
TDS	Quarterly	GSD	24 hr Comp	2540 C.
Cadmium	Semi-annually	OEC	24 hr Comp	EPA 200.8
Lead	Semi-annually	OEC	24 hr Comp	EPA 200.8
Priority Pollutants	Annually	OEC Ceres	24 hr Comp & Grab	Various

RECLAIMED WATER CHARACTERIZATION

Results of the reclaimed water chemical analyses used to monitor proper operation of the reclamation facility during 2020 are presented in Table 3. All monthly averaged data presented in this table are calculated from daily values with the exception of the monthly values for total coliform, which are reported as monthly averages of the 7-day median values. Permit limits if applicable are also shown in Table 3. Graphical summaries of the reclaimed water flows and results of chemical analyses are presented in Graphs 1 through 6.

TABLE 3. Monthly Average Reclamation Parameters, 2020

GOLETA SANITARY DISTRICT WASTEWATER LABORATORY
2020 MONTHLY AVERAGES
RECLAMATION FACILITIES

MONTH	Total Monthly Volume Filtered gallons	Average Monthly Volume Filtered gallons	Turbidity Daily Maximum NTU	Turbidity Daily Average NTU	Total Suspended Solids mg/L	BOD mg/L	Settleable Solids mL/L	pH units	Total Coliform MPN per 100 mL	Contact Time Average mg-min/L	Contact Time Minimum mg-min/L	Total Dissolved Solids mg/L	Cadmium mg/L	Lead mg/L
Jan														
Feb	14,660,848	862,403	0.33	0.20	< 1.0	3.5	< 0.10	7.2	< 1.0	5,677	2,486	1,244		
Mar	8,322,994	924,777	0.58	0.23	< 1.0	3.6	< 0.10	7.2	< 1.0	2,901	2,433			
Apr	3,269,764	653,953	0.31	0.19	< 1.0	3.6	< 0.10	7.0	< 1.0	5,408	4,114	1,111	< 0.00050	< 0.00050
May	36,669,748	1,358,139	0.35	0.26	1.1	2.0	< 0.10	7.1	< 1.0	2,517	2,030			
Jun	37,308,098	1,243,603	0.48	0.35	1.4	9.6	< 0.10	7.2	< 1.0	2,059	1,649			
Jul	46,272,833	1,492,672	0.70	0.46	2.1	9.7	< 0.10	7.0	< 1.0	1,808	1,435	1,136		
Aug	49,088,880	1,583,512	0.54	0.41	1.1	9.2	< 0.10	7.0	< 1.0	1,589	1,271			
Sep	33,546,239	1,118,208	0.53	0.39	1.2	9.4	< 0.10	7.0	< 1.0	1,990	1,548			
Oct	31,410,862	1,047,029	1.16	0.73	1.9	9.2	< 0.10	7.0	< 1.0	2,292	1,848	1,132	< 0.00050	< 0.00050
Nov	24,807,700	855,438	0.98	0.62	1.5	4.1	< 0.10	7.0	< 1.0	3,055	2,297			
Dec														
Total	285,357,966													
Average		1,113,973	0.60	0.39	< 1.3	6.4	< 0.10	7.1	< 1.0	2,930	2,111	1,156	< 0.00050	< 0.00050
NPDES Limit		3,000,000	5	2	10	10			2.2	> or = 450	> or = 450	1,500	0.01	5

Treatment Flow

A total of 285 million gallons of secondary effluent was filtered through the reclamation facility during 2020. Demand for reclaimed water increased dramatically from the time the treatment plant was first put on-line in 1994 and continued to increase until 1997 when the Goleta Water District completed construction of the current distribution system. Since then, the amount of reclaimed water produced by the Goleta Sanitary District has remained somewhat constant.

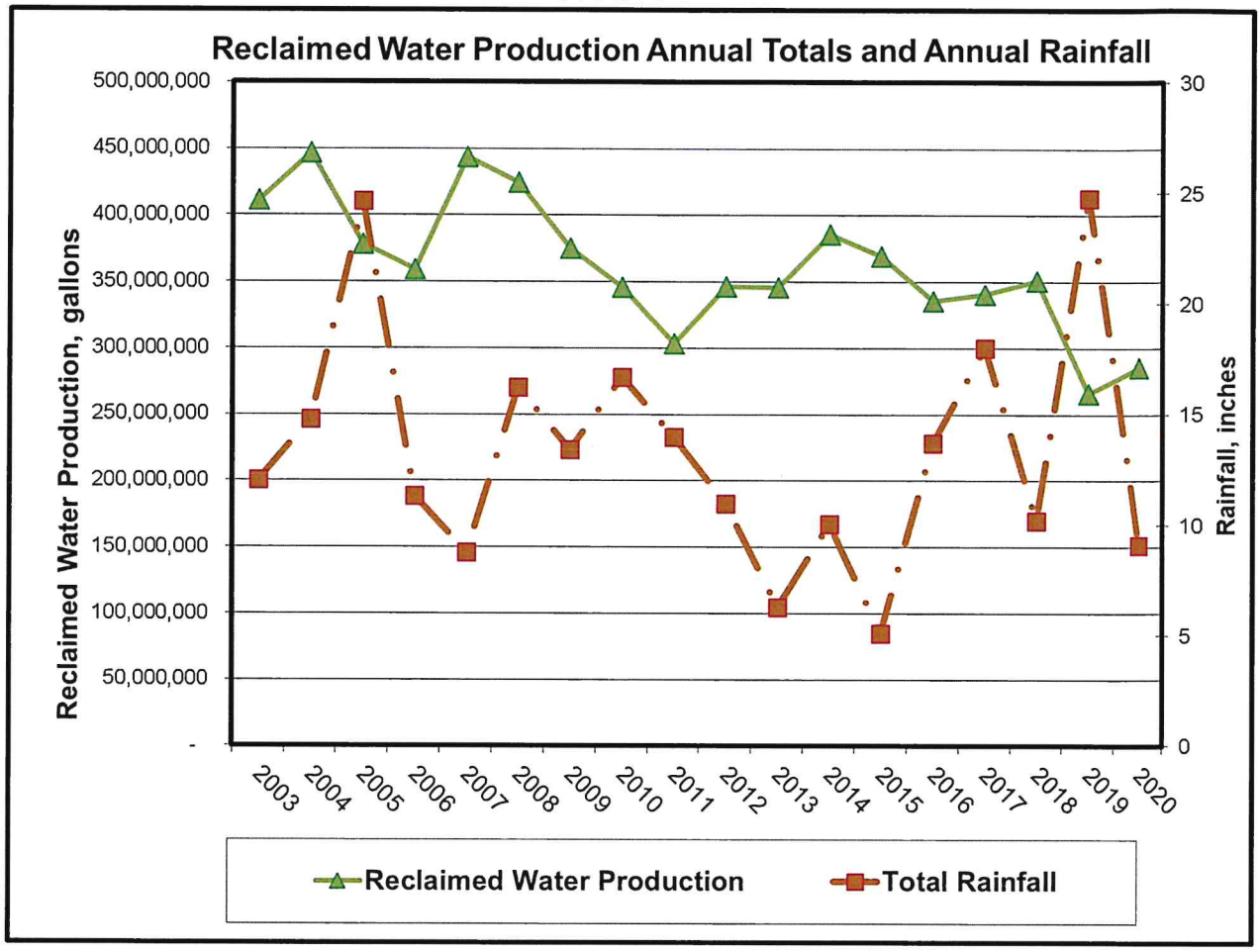
As shown in Table 4, and Graph 1, the volume of reclaimed water produced during 2020 is typical of the amount since the distribution system was expanded in 1997. The average annual amount produced over the 24 years is 368 million gallons, approximately 29% more than what was produced during 2020.

Table 4. Annual Total Reclaimed Water Production, 1996 – 2020		
Year	Production, gallons	Rainfall, inches
1996	109,112,000	23.2
1997	385,753,500	10.0
1998	329,447,300	37.7
1999	421,075,600	8.3
2000	406,875,900	19.8
2001	334,096,500	25.1
2002	445,230,100	12.3
2003	411,137,500	12.0
2004	446,849,300	14.8
2005	378,554,300	24.6
2006	359,285,400	11.3
2007	443,866,170	8.7
2008	424,763,757	16.2
2009	375,384,904	13.4
2010	345,683,190	16.7
2011	303,619,600	14.0
2012	346,706,200	11.0
2013	346,046,100	6.3
2014	386,142,088	10.1
2015	369,363,600	5.1
2016	335,564,700	13.7
2017	341,084,200	18.4
2018	351,056,869	10.2
2019	266,265,434	24.8
2020	285,357,966	9.1

Due to a significant rainfall decrease during 2020, the volume of water produced was approximately 19 million gallons more than 2019. As seen in Table 4, the reclaimed water production peaked in 2004 and 2007 then declined every year until 2012 where it stabilized. In general, the amount of reclaimed water produced each year can be loosely correlated with the amount of total rainfall. For example, from 2018 to 2019 the amount of rainfall for the year increased by 14.6 inches and the amount of reclaimed water produced decreased by 84 million gallons. Similarly, from 2006 to 2007 rainfall totals decreased by almost 3 inches and 84 million gallons more of reclaimed water was produced. Under this observation, the amount of rainfall will be a significant factor in reclaimed water production for 2021.

Graph 1 shows the total annual reclaimed water production and the total annual rainfall in the Goleta Valley as measured at the wastewater treatment plant rain gauge. In general, as the total precipitation increases, the amount of reclaimed water needed in the community for landscape irrigation decreases. However, the community has increased water conservation practices over the last few years due to the drought conditions. The relationship between the reclaimed water demand and annual rainfall is demonstrated in Graph 1.

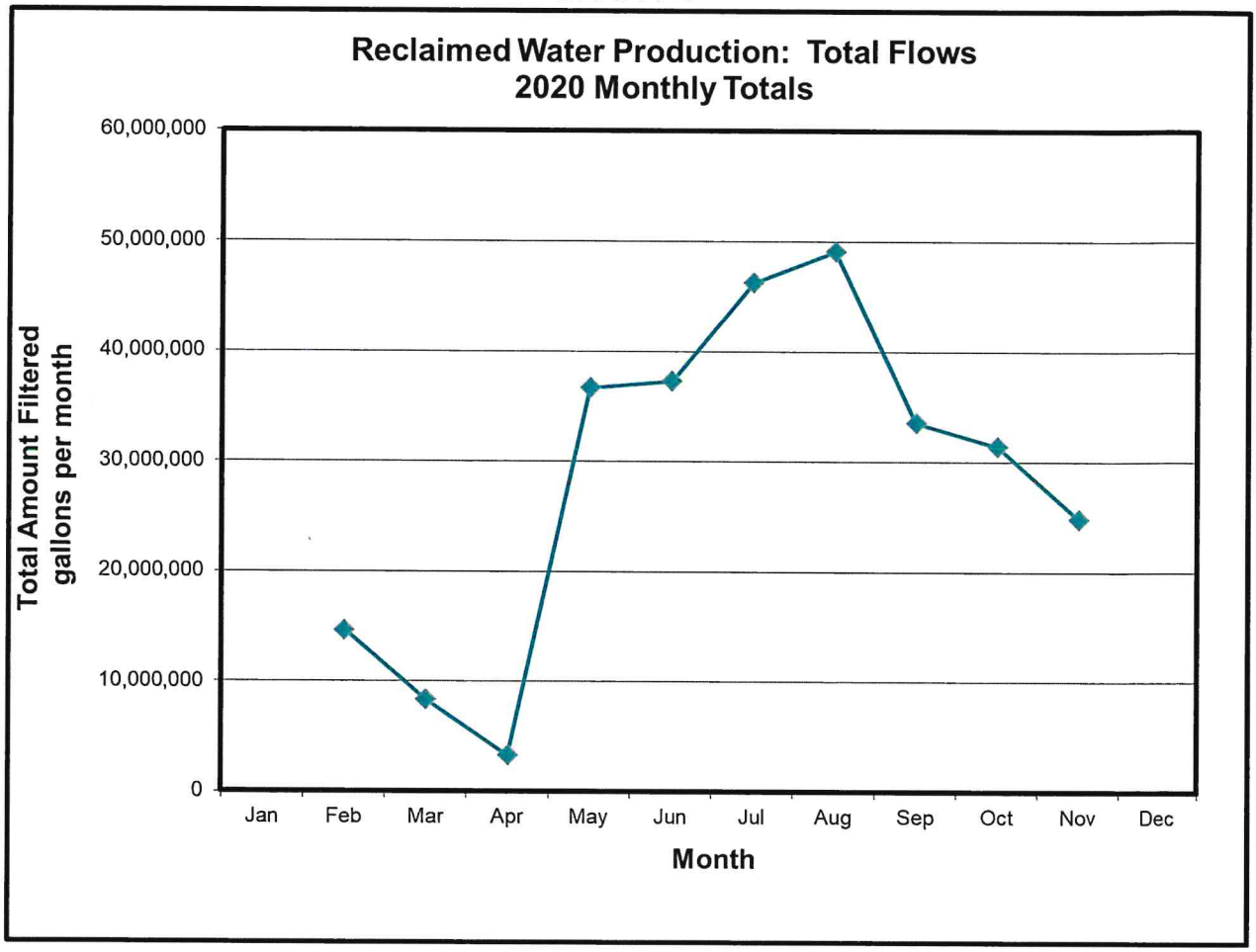
GRAPH 1



Higher volumes of reclaimed water are produced during the dry summer months when the reclaimed water demand for irrigation is greatest due to the lack of rainfall and hotter weather patterns. During 2020, the maximum reclaimed water production occurred in August, when over 49 million gallons were produced. The lowest months for reclaimed water production occurred during January, April and December. An increase in production occurred during May through October to meet the demand.

With the drop in daytime temperatures during the fall and winter and the occasional rainstorm, the production of reclaimed water tends to decrease throughout the fall. Graph 2 illustrates the variations in the total amount of reclaimed water produced each month. These variations are due to fluctuations in landscape irrigation demands throughout the year with the greatest demands occurring during the dry summer months.

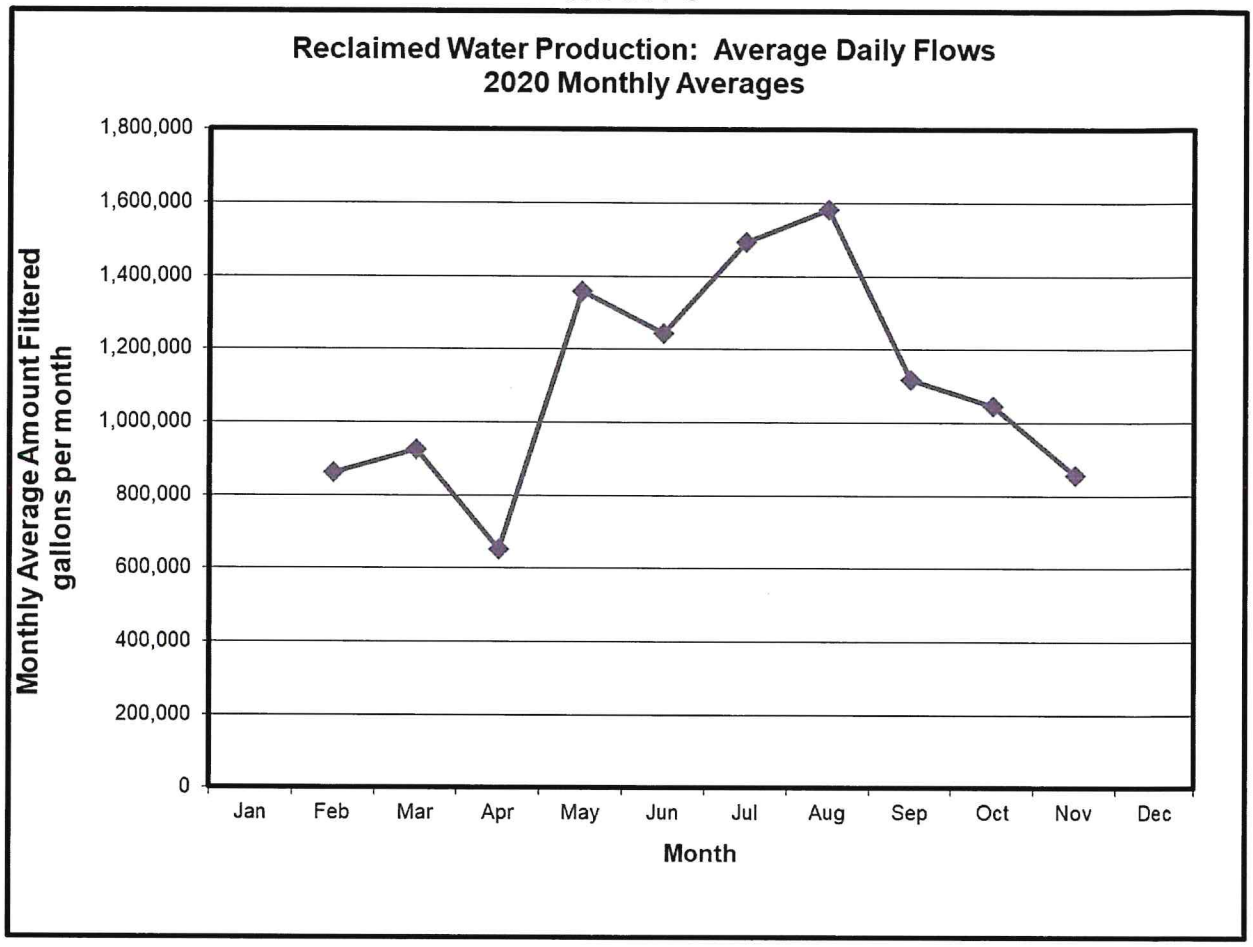
GRAPH 2



The high for a single day of operation occurred on June 12th when 2.3 million gallons of secondary effluent was filtered in a 24-hour period. The reclamation plant operated 239 days during 2020, a slight increase from the 233 days in 2019 and less than the 288 days of operation recorded during 2018.

The February, March and April data, may be skewed because of the small number of days the facility was operating; however, the average monthly increases and decreases closely follow the same pattern as seen in the total volume of reclaimed water production shown in Graph 2. The average monthly production is somewhat higher by reporting per day of operation than it would be if reporting by the number of days in the month. The average monthly volume of reclaimed water produced per day of operation throughout 2020 ranged from a low of 0.65 MGD during April to a high of 1.6 MGD during August. However, no reclaimed water was produced during the months of January and December. The overall average annual reclaimed water produced per day of plant operation was 1.19 MGD. Graph 3 illustrates the average monthly amount of reclaimed water produced per day of operation for 2020.

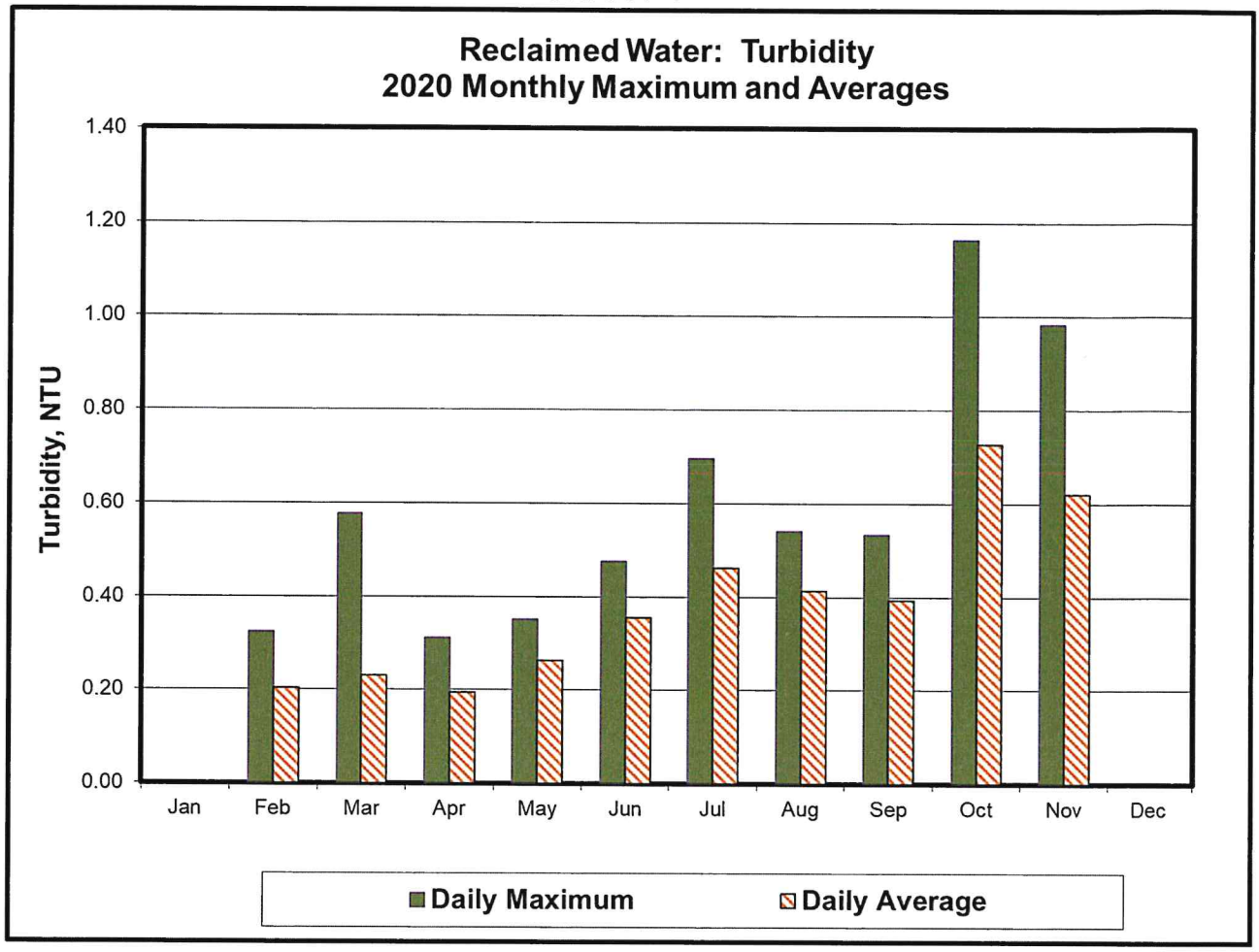
GRAPH 3



Turbidity

Reclaimed water effluent turbidity is monitored continuously with two on-line HACH turbidimeters. Permit limits for reclaimed water effluent turbidity must be met following filtration and may not exceed a mean of 2 NTU. Permit limitations specify a maximum turbidity of 5 NTU, which cannot be exceeded, more than 5 percent of the time during any 24 hour period. The highest maximum turbidity value during 2020 was 4.33 NTU on October 29th. Monthly averages were very consistent throughout the year and were well below all permit limits. Graph 4 illustrates the small amount of monthly variations in the average reclaimed water turbidity. Monthly average mean values were very stable and fluctuated between a low of 0.19 to a high of 0.73 NTU. At no time during the year did the mean turbidity exceed the 2 NTU limit.

GRAPH 4

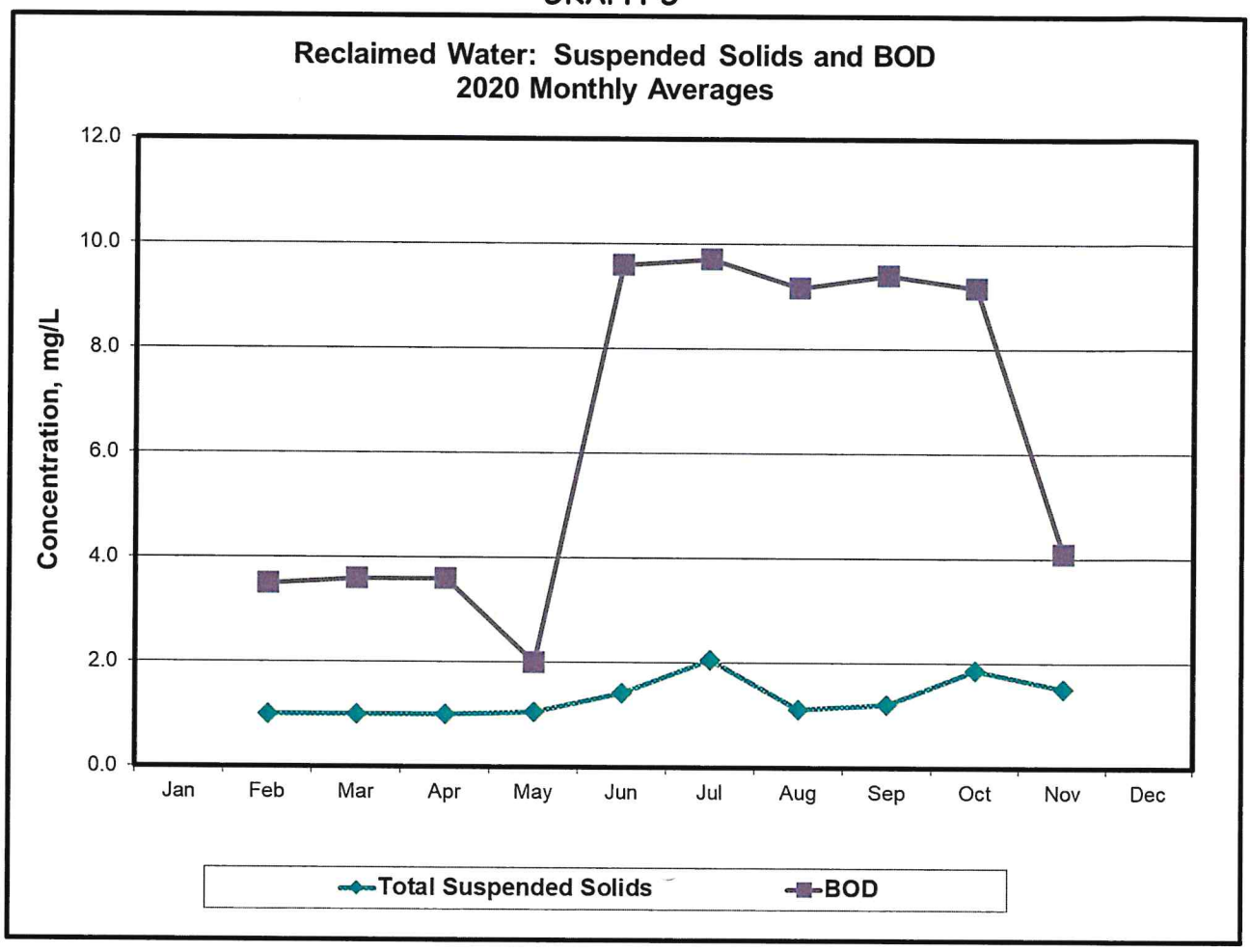


Total Suspended Solids

Total suspended solids (TSS) are measured on 24-hour composite samples, 5 days per week, when the reclamation filter plant is operating on a daily basis. When plant operation is sporadic, as is often the case during the winter months, total suspended solids are collected and analyzed whenever the reclamation treatment plant is in operation.

The reclamation facility is very effective at removing suspended solids from the secondary effluent, as evidenced by the consistently low suspended solids concentrations in the reclamation water. The TSS concentrations ranged from a monthly averaged low below 1.0 mg/L to an averaged high of 2.1 mg/L in July. The 2020 annual high total suspended solids concentration for the reclaimed water was 6.4 mg/L, which is below the 10 mg/L permit limit. Graph 5 demonstrates the very consistent and low suspended solids concentrations obtained throughout 2020.

GRAPH 5



Biochemical Oxygen Demand

GSD's current NPDES permit, WDR Order R3-2017-0021, incorporates the operating and monitoring requirements for the reclamation facility which includes monthly BOD monitoring. BOD values of the reclamation water can fluctuate due to the nitrifying bacteria present in the sample which is collected after coagulation and filtration but prior to disinfection. The reclaimed water BOD was below the monthly average limit of 10 mg/L during 2020. Graph 5 summarizes BOD monthly average data.

pH

Hydrogen ion concentrations are measured daily on a grab reclaimed water effluent sample whenever the treatment plant is in operation. Daily pH values have been relatively stable throughout the year and therefore so are the monthly averages. pH varied by a less than 1.0 pH units throughout the year from 6.7 to 7.5.

Total Coliform

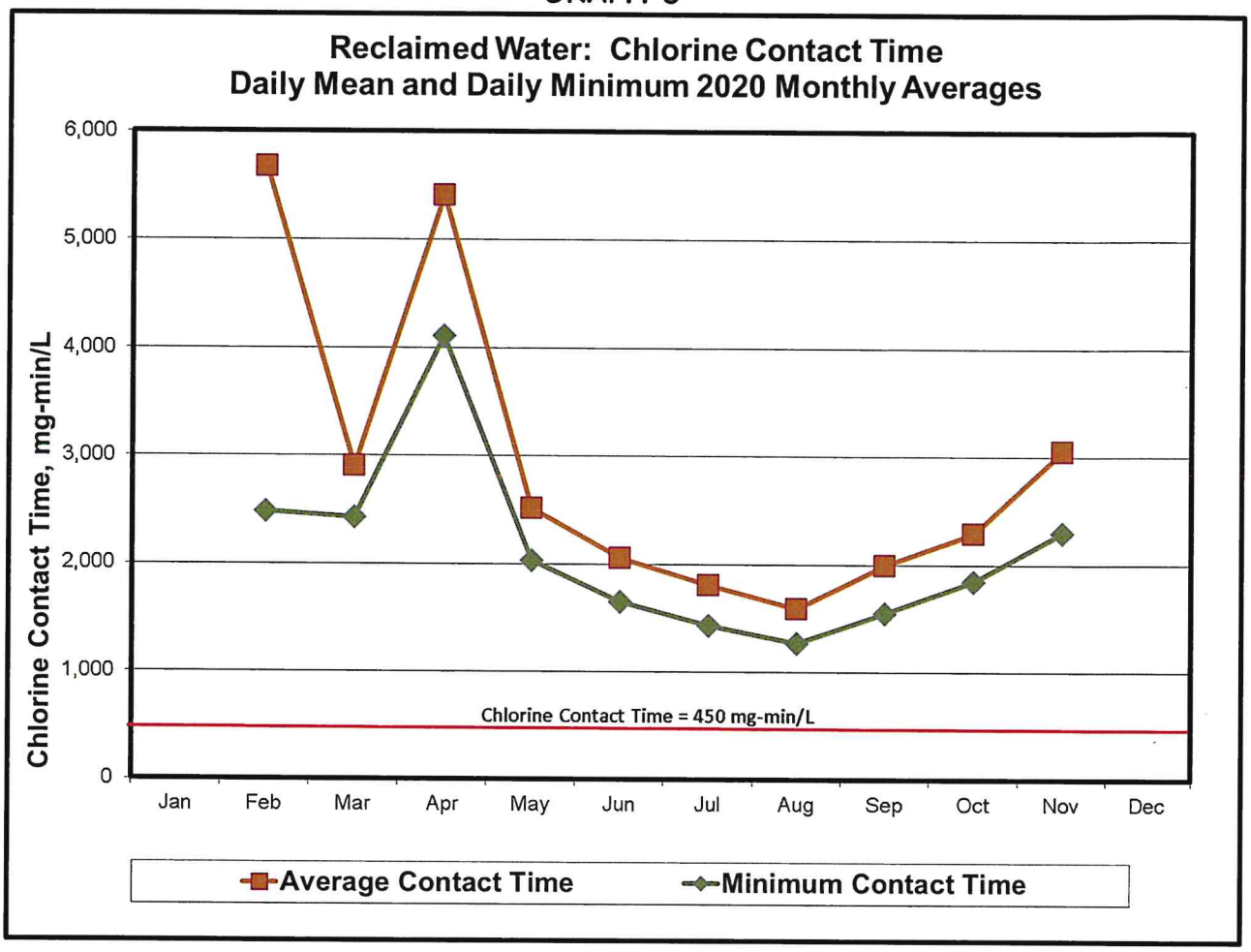
The reclamation effluent is analyzed for total coliform organisms each day that the plant is in operation. The GSD laboratory is certified for the total coliform analysis by the IDEXX method using Colilert and Quanti-tray. The analytical method provides results in 24 to 28 hours which provides the operators with information to make adjustments, if necessary. An analyst error occurred resulting in a deficient monitoring violation. The error affected the sample collected on September 1st causing the sample to be invalidated. Corrective actions were implemented immediately to ensure the error does not occur again. Total coliform results reported as monthly averages are shown in Table 3.

Reclaimed Water Disinfection

Reclaimed water disinfection at the GSD is achieved by adding liquid sodium hypochlorite at the front end of the chlorine contact channel. Chlorine residuals are continuously monitored both at the beginning and at the end of the chlorine contact tank. The disinfection system has been effective in removing coliform bacteria from reclaimed wastewater allowing the District to meet the bacterial requirements stipulated in the RWQCB operating permit during 2020.

Chlorine contact tank design parameters indicate that the total detention time of the reclaimed water in the contact tank at maximum flow is 92 minutes, which meets the 90-minute minimum requirement. The current permit limit is to achieve no less than 450 mg-min/L of chlorine concentration contact time. Graph 6 illustrates the average monthly mean and average monthly minimum contact times for 2020.

GRAPH 6



Total Dissolved Solids

Total dissolved solids are monitored on a quarterly basis in January, April, July, and October. Since the facility wasn't operated during January, the first quarter sample was analyzed during February. The total dissolved solids concentrations reported in 2020 were consistent throughout the year and ranged from a low of 1,111 mg/L in April to a high of 1,244 mg/L in February. The annual average was 1,156 mg/L. All values were below the permit limit of 1,500 mg/L. Total dissolved solids results are reported in Table 3.

Metals

The reclaimed water permit requires semi-annual metals testing for cadmium and lead in April and October. Metals analyses are performed on 24-hour composite samples, which are collected and sent to an outside, contract laboratory. All analyses indicated that the concentrations of cadmium and lead were well below the permit limits of 0.01 mg/L for cadmium and 5 mg/L for lead. The actual values are reported in Table 3.

Priority Pollutants& Metals

The recycling permit specifications requires analysis of priority pollutants to be performed on the reclaimed water annually. Detected organic compounds results are presented in Table 5 as well as metals, asbestos and dioxin results; complete copies of all the laboratory reports listing all the chemical compounds and analytical methods are available upon request. Fourteen compounds were detected in the reclaimed water. Concentrations of detected chemicals are noted next to the parameter and corresponding units in the table.

Table 5. Detected Priority Pollutants, 2020

Parameter, units	Result
Antimony, mg/L	0.0027
Arsenic, mg/L	0.0037
Benzoic acid, ug/L	3.6
Beryllium, mg/L	0.00065
Bromodichloromethane, ug/L	1.9
Cadmium, mg/L	<0.00050
Chloroform, ug/L	4.0
Chromium, mg/L	0.0015
Copper, mg/L	0.012
Cyanide, mg/L	<0.10
Dibromochloromethane, ug/L	0.65
Lead, mg/L	0.0019
Nickel, mg/L	0.0067
Mercury, mg/L	< 0.00010
Selenium, mg/L	0.0079
Silver, mg/L	< 0.00050
TCDD, equivalents, pg/L	0
Thallium, mg/L	0.00060
Zinc, mg/L	0.028
Asbestos, MFL	ND
ND = Not Detected	

DISCHARGE COMPLIANCE

Throughout 2020, the Goleta Sanitary District complied with all applicable monitoring and reporting program limitations with the exception of one occurrence of total coliform bacteria deficient monitoring.

The chlorine contact time as measured at the end of the chlorine contact channel met the minimum limitation as required by RWQCB Order No. R3-2017-0021 on all days. All turbidity limits were met following filtration. Total suspended solids were determined to be well below the permit limits of 10 mg/L. All other detected constituents were below their respective limitations.

All indications are that the reclamation plant continues to operate effectively.