GOLETA SANITARY DISTRICT

BIOSOLIDS ANNUAL REPORT 2018

GOLETA SANITARY
Water Resource Recovery District

"Protecting Public Health and the Environment"

Submitted: February 2019

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BIOSOLIDS ANNUAL REPORT

I. GENERAL

1.	**Name of Generator:**	Goleta Sanitary District
2.	**Permit No.:** **Order No.:**	CA 0048160 R3-2017-0021
3.	**Location:**	1 William Moffett Place Goleta, CA 93117
4.	**Mailing Address:**	1 William Moffett Place Goleta, CA 93117
5.	**Contact Person:**	John Crisman, Operations Manager
6.	**Telephone:**	(805) 967-4519
7.	**Influent Flow:**	4.6 MGD 2018 Average Daily Flow
8.	**Sludge Treatment Process:**	

The Goleta Sanitary District (GSD) completed a major treatment plant upgrading project in December 2013. The main purpose of the construction project was to upgrade the partial secondary treatment portion of the facility to be able to treat 100% of the inflow to the full secondary level. The solids treatment portion of the facility was also upgraded as part of the project. Two of the five sludge drying beds were demolished to make room for a new solids handling building. The solids handling building contains two screw presses, two secondary sludge thickeners, pumping equipment, a chemical storage area, a screw conveyor for loading biosolids trucks and a sludge holding tank.

Settleable solids and floatable materials are skimmed from the three primary clarifiers and transferred to one of the three anaerobic digesters. Secondary solids are mechanically thickened also using polymer and fed to the anaerobic digesters. The raw sludge is digested in the three heated anaerobic digesters for an average of 32 days at an annual average temperature of 98.6°F (37.0°C). Anaerobic digestion decomposes organic material, which produces digester gas composed primarily of methane. The digester gas is circulated to the boilers where it is used as fuel to heat the sludge in the digesters. Sludge from the digesters is pumped on a daily basis into one of two stabilization basins (lagoons) where the sludge is allowed

to settle and continue to decompose.

As the stabilization basins fill, stabilized sludge is dredged from the bottom of these basins and is dewatered by a screw press and thickened by the addition of polymer to enhance coagulation. The resultant sludge is compressed to approximately 15.5 percent solids. This method is used to generate Class B biosolids.

The sludge, which is air dried in the sludge drying beds, is made available to the local community as a Class A exceptional quality biosolids product for use as a soil amendment in home lawns and gardens. Prior to distribution, this material is tested to ensure that it meets all requirements for Class A biosolids as stated in 40 CFR Part 503 Regulations.

9. Biosolids Distribution Programs:

A small amount of Class A exceptional quality biosolids was produced by extended air drying in the sludge drying beds during 2015. The biosolids were available to the local community for use as a soil amendment in home lawns and gardens during 2018.

Western Express Inc. hauled the District's Class B biosolids to Liberty Composting Inc. located at 12421 Holloway Road, Lost Hills, CA 93249. The administrative office for Western Express Inc., is located at 1533 E. Shields Ave., Suite F, Fresno, CA 93607. Copies of the agreement with Liberty Composting and the agreement with Western Express are available upon request. The annual biosolids report submitted by Liberty Composting Inc., is herewith incorporated by reference.

10. Summary

On November 10, 2017, the Goleta Sanitary District's current NPDES permit became effective. The Goleta Sanitary District operates under NPDES Permit No. CA0048160 and Waste Discharge Requirements (WDR) Order No. R3-2017-0021. These permits contain sludge-monitoring programs requiring the District to analyze its sludge for various constituents on either an annual or quarterly basis depending on the constituent. The District's NPDES permit also stipulates that the District's biosolids must meet all of the regulations contained in 40 CFR Part 503.

All of the District's quarterly and annual biosolids sampling involved collecting biosolids samples from the screw press. Pollutants identified in Tables 1 through 4 of 40 CFR Part 503.13 are measured on a quarterly basis while the other priority pollutants such as, grease and oils, dioxin, PCBs, organochlorine pesticides, etc., are monitored annually, in October. Frequency requirements for vector attraction reduction and pathogen classification monitoring follow the criteria set forth in 40 CFR 503 Regulations.

All biosolids currently being produced and distributed by GSD are released in bulk form as "Pollutant Concentration (PC) Biosolids, Class B", and, as such, they meet 40 CFR Part 503 sections 503.12 and 503.14, General Requirements and Management Practices. During 2018, a total of 1,009 dry metric tons of bulk biosolids were produced by the Goleta Sanitary District.

A small amount of Class A biosolids were produced during 2015. Biosolids dredged from the stabilization basins and solar dried in the sludge drying beds are tested and given away as "Class A Biosolids of Exceptional Quality". These biosolids are to be used in home lawns and gardens, and as such, they are exempt from the General Requirements and Management Practices of 40 CFR Part 503 Sections 503.12 and 503.14, respectively. Throughout 2018 a total of 3.4 cubic yards (1.0 dry metric tons) of biosolids were distributed to the local community.

II. LAND APPLIED BIOSOLIDS

1. Volume:

From January 2018 to December 2018, the Goleta Sanitary District distributed a total of 1,010 dry metric tons of biosolids. According to *40 CFR 503.8(b)(4)* and *Table E-12 Amount of Biosolids and Frequency of Analysis* this amount of biosolids is required to be monitored quarterly.

Table 1 summarizes the total amount of biosolids in wet tonnage distributed on a monthly basis. The values in Table 1 are not reported on a dry weight basis, however the annual totals in the final rows are reported on a dry weight basis.

Table 1. Monthly Biosolids Distribution 2018, Wet Tons

Month	Liberty Composting Inc. Class B
January	705.75
February	681.03
March	336.49
April	688.41
May	769.69
June	560.38
July	588.86
August	697.25
September	567.59
October	698.71
November	537.26
December	343.22
Wet Ton Total	
Class A	**Liberty Composting**
1.7	**7,174.64**
Dry Metric Ton Total	
Class A	**Liberty Composting**
1.0	**1,009**

2. Priority Pollutants:

Based on the amount of biosolids distributed from January 2018 to December 2018 the District was required to monitor 503.13 priority pollutant concentrations at a frequency of once per quarter as stated in Table 1 of 40 CFR part 503.16, *Frequency of Monitoring-Land Application*. The quarterly priority pollutant monitoring occurred in January, April, July, and October, and also fulfilled the sludge monitoring requirements of the District's NPDES permit.

Trace Metals

The results of the trace metal priority pollutants are tabulated below in TABLE 2. Liberty Farms also had the biosolids from GSD analyzed trace metals and other constituents twice a year. Table 3 summarizes the Liberty Farms testing results. Not all metals were analyzed for all samples every quarter. An analysis that was not performed on a specific sample is denoted by the letters "NA". Samples listed as NA – not analyzed - are analyzed typically on an annual basis in October only. All laboratory results indicate that the District's biosolids meet all of the metal pollutant limits found in TABLE 4 of 503.13 for the "Exceptional Quality" and "Pollutant Concentration" designations.

Class B results in Table 2 and Table 3 are reported in mg/dry Kg. Percent moisture at the time of sampling is also recorded. Laboratory reports will be provided upon

request.

Table 2. PRIORITY POLLUTANTS BIOSOLIDS 2018, mg/dry Kg

POLLUTANT	POLLUTANT LIMITS Part 503 Table 3, Sec 503.13	January 2018 Screw Press 1/3/2018	April 2018 Screw Press 4/4/2018	July 2018 Screw Press 7/18/2018	October 2018 Screw Press 10/10/2018
Antimony	NL	NA	NA	NA	<5.3
Arsenic	41	<1.3	<6	<6.7	<5.3
Boron	NL	70.4	59.2	18	<13
Beryllium	NL	NA	NA	NA	<1.3
Cadmium	39	1.31	1.32	<1.0	<0.80
Chromium	* (1)	37.6	40.4	51	55
Copper	1,500	837	890	870	750
Lead	300	15.9	11.5	9.9	16
Mercury	17	0.0632	0.702	0.63	0.85
Molybdenum*(2)	75	17.0	14.8	18	16
Nickel	420	22	21.3	30.0	34
Phosphorus	NL	25,200	37,900	30,000	33,000
Selenium	100	8.33	8.75	<6.7	<5.3
Silver	NL	7.15	5.62	<1.3	2.5
Thallium	NL	NA	NA	NA	<2.7
Zinc	2,800	940	1,000	950	910
pH	NL	NA	NA	NA	8.13
Oil & Grease	NL	NA	NA	NA	810
% Moisture	NL	83.3	83.2	86.0	82.8
Nitrate	NL	<5.9	<24	<3.5	NA
Organic Nitrogen	NL	1,990	38,250	49,700	51,100
Kjeldahl Nitrogen	NL	6,880	42,900	57,000	55,000
Ammonia	NL	4,890	4,650	7,300	3,900

NL = No Limit. NA = Not Analyzed.

*(1) On October 25, 1995 the EPA amended Part 503 to delete chromium standards from Tables 1 through 4 of Subpart B, Land Application.

*(2) The EPA amended Part 503 on February 25, 1994 to delete temporarily the Table 3 molybdenum limits. However, the ceiling limit of 75 mg/Kg from Table 1 has been

retained and must be met.

Table 3. LIBERTY FARMS PRIORITY POLLUTANTS BIOSOLIDS RESULTS 2018, mg/dry Kg

POLLUTANT	POLLUTANT LIMITS Part 503 Table 3, Sec 503.13	January 2018 1/24/2018	October 2018 10/30/2018
Total Coliform (MPN/g)	NL	>16,000,000	>160,000,000
Antimony	NL	12.7	<4.32
Arsenic	41	<6.15	8.64
Barium	NL	515	403
Beryllium	NL	<2.05	<1.44
Cadmium	39	<4.10	<2.88
Chromium	* (1)	54.4	48.6
Chromium $^{6+}$	NL	<6.6	<4.7
Cobalt	NL	4.08	2.04
Copper	1,500	1,150	706
Lead	300	16.8	19.1
Mercury	17	0.935	1.34
Molybdenum*(2)	75	21.6	14.5
Nickel	420	34.0	25.2
Selenium	100	8.70	<4.32
Silver	NL	6.37	3.89
Thallium	NL	< 6.15	<4.32
Vanadium	NL	14.7	8.68
Zinc	2,800	1,210	822
pH	NL	7.57	7.81
TDS	NL	2,160	3,390
% Solids	NL	12.2	17.2
Nitrate	NL	<4.1	<2.9
Kjeldahl Nitrogen	NL	70,000	52,000

NL = No Limit. NA = Not Analyzed.

Organic Nitrogen

The biosolids were analyzed individually for both total kjeldahl nitrogen and ammonia nitrogen. *Standard Methods for the Examination of Water and Wastewater, 18th Edition*, Method 4500-N $_{org}$ B states that "Should kjeldahl nitrogen and ammonia nitrogen be determined individually, "organic nitrogen" can be obtained by difference." The organic nitrogen concentrations that are summarized in Table 2 were determined in this manner.

Pesticides and Organics

As part of the annual October sampling requirement, biosolids samples were collected by District personnel and analyzed by OEC Environmental & Compliance Lab, for organochlorine pesticides and organic chemicals as defined by EPA methods 8081A, 8260B, 8270C. Of the over 150 compounds analyzed only five compounds were detected. No limits for these compounds are specified by 40 CFR Part 503. The concentrations of the priority pollutants detected in this sample were reported on a dry weight basis and are summarized in Table 4 as well as the TCDD Equivalent calculated result and the cyanide result. The laboratory reports will be provided upon request.

Table 4. DETECTED PARAMETERS, BIOSOLIDS, October 2018

Parameter, concentration unit	Concentration
4-Isopropyltoluene, mg/kg	0.053
Methylene chloride, mg/kg	0.10
Napthalene, mg/kg	0.016
Xylenes, mg/kg	0.018
Bis(2-Ethylhexyl)phthalate, mg/kg	2.9
Cyanide, mg/kg	14
TCDD Equivalents, pg/g	3.87

Dioxin

The October 2018 biosolids sample was analyzed for all dioxin isomers using EPA Method HR EPA 1613B Full List. Eleven of the seventeen dioxin isomers were detected by this method in the sample this year. All flagged results even those reported as estimates were used in the final calculation for TCDD equivalents. The resulting TCDD equivalence is 3.87 pg/g. The laboratory results are available upon request.

3. Class B

Bulk Distribution – Management Practices

The bulk biosolids were used by Liberty Composting, Inc. Liberty Composting operates a 162-acre composting facility located in Lost Hills, CA. Liberty Composting employs both windrow composting and aerated static pile composting for attainment of Class A sewage sludge in accordance with provisions of the Federal Part 503 Regulations – Standards for the Use or Disposal of Sewage Sludge, 503.32(a)(1), *Sewage Sludge Class A.*

Pathogen Classification

The bulk biosolids prepared at the Goleta Sanitary District for land application meet Class B requirements of 40 CFR Part 503.32(b)(3), Class B-Alternative 2. This alternative states that the Class B requirements can be met if the sewage sludge is treated in one of the Processes to Significantly Reduce Pathogens as described in Appendix B to Part 503-Pathogen Treatment Processes.

The sewage sludge at the Goleta Sanitary District is treated in anaerobic digesters in the absence of air for an average of approximately 32 days at 37.0 degrees Celsius. This process meets the mean cell residence time and temperature of 15 days at 35 to 55 degrees Celsius described in Appendix B to Part 503.

Class B - Vector Attraction Reduction

Biosolids prepared at the Goleta Sanitary District meet the vector attraction reduction requirement listed in 503.33(b)(1) which states that "the mass of volatile solids in the sewage sludge shall be reduced by a minimum of 38%." The fractional volatile solids reduction (FVSR) was calculated using the Van Kleeck Equation as found in EPA/625/R-92/013, "Control of Pathogens and Vector Attraction in Sewage Sludge, December 1992, p. 89. Results are summarized below in TABLE 5.

Table 5. VOLATILE SOLIDS REDUCTION

Screw Pressed Biosolids	Fractional Volatile Solids of Feed Sludge	Fractional Volatile Solids of Biosolids	Fractional Volatile Solids Reduction*	Percent Volatile Solids Reduction
2018 Averages	0.8077	0.6642	0.529	53%

*FVSR is calculated using the Van Kleeck Equation as found in EPA/625/R-92/013, "Control of Pathogens and Vector Attraction in Sewage Sludge, December 1992, p. 89.

4. Class A

Priority Pollutants – Trace Metals

The Class A trace metal priority pollutant results are tabulated below in TABLE 6. Percent moisture at the time of sampling is also recorded. Laboratory reports will be provided upon request.

Table 6. PRIORITY POLLUTANTS BIOSOLIDS 2015, mg/dry Kg

POLLUTANT	POLLUTANT LIMITS Part 503 Table 3, Sec 503.13	April 2015 Drying Bed 4/24/2015	November 2015 Drying Bed 11/2/2015
Arsenic	41	<8.46	2.01
Cadmium	39	28.76	2.29
Chromium	* (1)	57.87	NA
Copper	1,500	1,106.60	22.2
Lead	300	30.29	20.9
Mercury	17	1.52	0.504
Molybdenum*(2)	75	20.30	14
Nickel	420	48.73	29.8
Selenium	100	10.15	<0.50
Zinc	2,800	1,211.51	274
% Moisture	NL	40.9	33.1

NL = No Limit. *(1) & *(2) footnotes can be found below Table 2.

Pathogen Classification

Biosolids dredged from the stabilization basins into the sludge drying beds for solar/air drying in March 2015 and identified as batch # 1, was distributed to the community beginning in July 2015. Another batch of sludge was produced in October 2015 which was dredged from the stabilization basins into the sludge drying beds for air/solar drying. The October batch (batch#2) was processed and tested but was not released for public distribution during 2015. The batches were mixed and were released for distribution during 2016. The distribution of the class A biosolids continued during 2018 and the estimated volume can be found in Table 1.

Fecal Coliform

At the time of distribution all Class A biosolids had undetected or very low concentrations of fecal coliform. Fecal coliform was analyzed according to Standard Method 9221 E.; the multiple tube fermentation technique. Solid biosolids samples were prepared via the method described in EPA/625/R-92/013 Environmental Regulations and Technology: Control of Pathogens and Vector Attraction, Appendix F, page 104. The MPN value was calculated using Thomas' formula shown as equation 1 and found in Standard Method 9221 C. Estimation of Bacterial Density.

$$MPN/100mL = \frac{\text{no. of positive tubes X 100}}{(\text{grams of sample in negative tubes x grams of sample in all tubes})^{1/2} X \% \text{ solids}}$$

The batch #1 sample collected and sent to BioVir Laboratories on 3/23/15 had a high fecal coliform result. After further processing, the biosolids were resampled for fecal coliform and analyzed at the certified in-house laboratory. The results are summarized below in TABLE 7 and the batch #2 result can be found in TABLE 8.

TABLE 7. BIOSOLIDS PATHOGENS - Fecal Coliform

Biosolids Batch	Testing Date: 03/24/15	Testing Date: 06/10/15
1	>2.7 e3 MPN per gram total solids	< 1.8 MPN per gram total solids

Batch #1 met the PATHOGEN REDUCTION REQUIREMENTS of Part 503, Section 503.32(a)(6)-Alternative 4 < 1,000 MPN per gram total solids.

TABLE 8. BIOSOLIDS PATHOGENS - Fecal Coliform

Biosolids Batch	Testing Date: 01/26/16
2	< 1.8 MPN per gram total solids

Batch #2 met the PATHOGEN REDUCTION REQUIREMENTS of Part 503, Section 503.32(a)(6)-Alternative 4 < 1,000 MPN per gram total solids.

Enteric Virus and Helminth Ova

All enteric virus and helminth ova concentrations were below the method detection limits. The enteric virus and helminth ova results from BioVir Laboratory from the combined batches of biosolids distributed in 2016 are summarized below in Table 9. Complete laboratory reports will be provided upon request.

TABLE 9. BIOSOLIDS PATHOGENS - Enteric Virus and Helminth Ova

PATHOGEN	PATHOGEN REDUCTION REQUIREMENTS Part 503, Section 503.32(a)(6)-Alternative 4	Biosolids Batch 1 Test Date: 03/24/15
Enteric Virus	< 1 PFU per 4 grams total solids	<1 PFU per 4 grams total solids
Helminth Ova	< 1 viable Helminth Ova per 4 grams total solids	<1 viable Helminth Ova per 4 grams total solids
PATHOGEN	PATHOGEN REDUCTION REQUIREMENTS Part 503, Section 503.32(a)(6)-Alternative 4	Biosolids Batch 2 Test Date: 11/9/15
Enteric Virus	< 1 PFU per 4 grams total solids	<1 PFU per 4 grams total solids
Helminth Ova	< 1 viable Helminth Ova per 4 grams total solids	<1 viable Helminth Ova per 4 grams total solids

Vector Attraction Reduction

The Class A biosolids prepared at the Goleta Sanitary District meets the vector attraction reduction requirement listed in 503.33(b)(1), which states that "the mass of volatile solids in the sewage sludge shall be reduced by a minimum of 38%." The fractional volatile solids reduction (FVSR) was calculated using the Van Kleeck Equation as found in EPA/625/R-92/013, "Control of Pathogens and Vector Attraction in Sewage Sludge, December 1992, p. 89. The average volatile solids reduction for the Class A biosolids distributed in 2016 was 86%. Results of the combined testing from batch #1 and batch #2 of biosolids distributed during 2016 are summarized below in TABLE 10.

TABLE 10. VOLATILE SOLIDS REDUCTION

Biosolids Batch #s	Fractional Volatile Solids of Feed Sludge	Fractional Volatile Solids of Biosolids	Fractional Volatile Solids Reduction*	Percent Volatile Solids Reduction
1 & 2	0.814	0.3805	0.860	86 %

*FVSR is calculated using the Van Kleeck Equation as found in EPA/625/R-92/013, "Control of Pathogens and Vector Attraction in Sewage Sludge, December 1992, p. 89.

5. Certification Statement – Class A

" I certify, under penalty of law, that the information that will be used to determine compliance with the pathogen requirements in 503.32(a) and the vector attraction reduction requirement in 503.33(b)(1) was prepared under my direction and supervision in accordance with the system designed to ensure that qualified personnel properly gather and evaluate this information. I am aware that there are significant penalties for false certification including the possibility of fine and imprisonment."

John Crisman
Operations Manager
Goleta Sanitary District

2/15/19
Date

6. Certification Statement – Class B

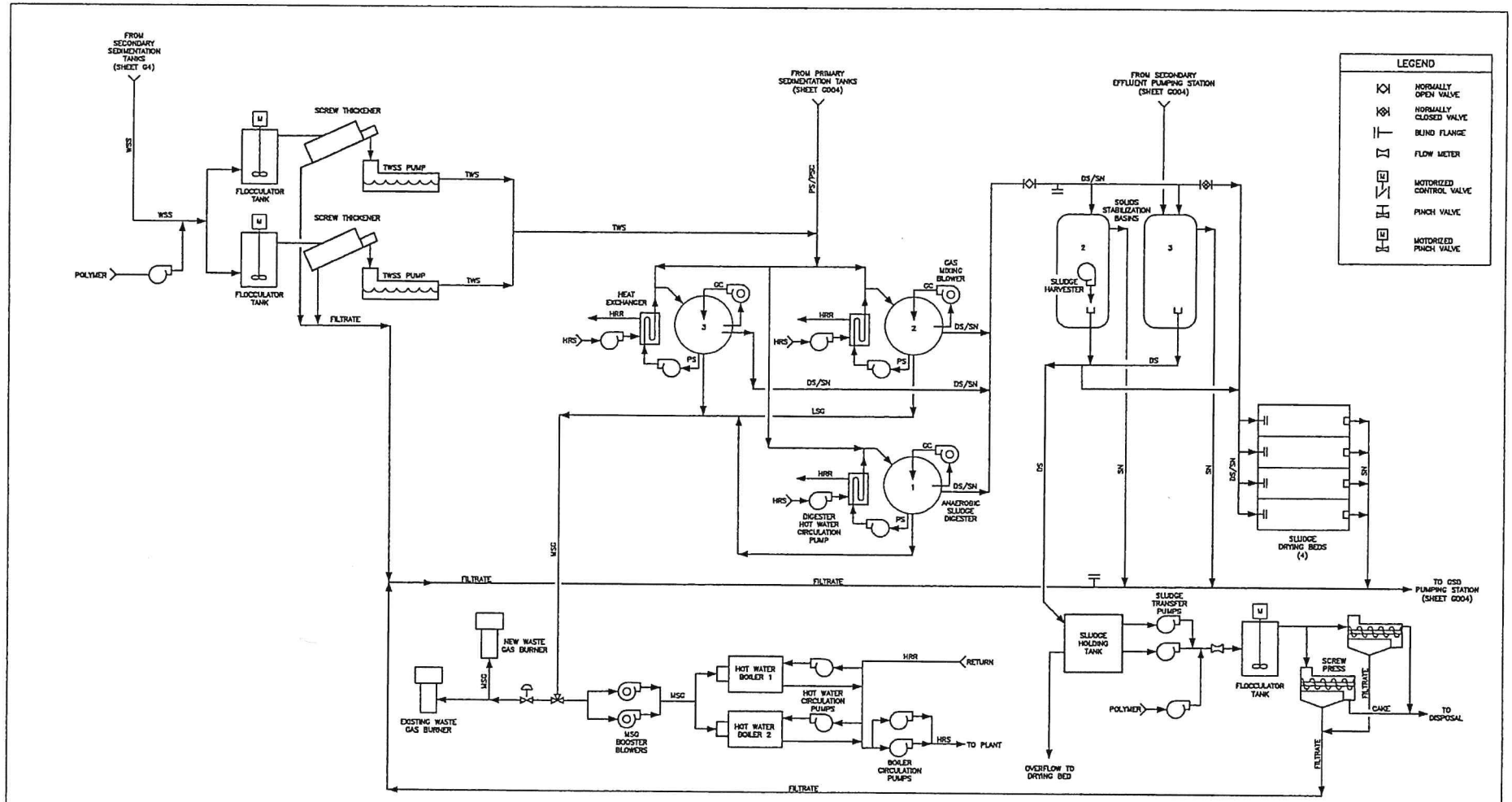
" I certify, under penalty of law, that the information that will be used to determine compliance with the pathogen requirements in 503.32(b) and the vector attraction reduction requirement in 503.33(b)(1) was prepared under my direction and supervision in accordance with the system designed to ensure that qualified personnel properly gather and evaluate this information. I am aware that there are significant penalties for false certification including the possibility of fine and imprisonment."

John Crisman
Operations Manager
Goleta Sanitary District

2/15/19
Date

APPENDIX A

Solids Flow Diagram



HDR

GOLETA SANITARY DISTRICT

PLANT FLOW DIAGRAM
SOLIDS

GOLETA WASTEWATER TREATMENT PLANT

DATE
04-01-12

FIGURE
G005