Baxter Wastewater Treatment Plant
NPDES Number:TN0021121
Site Tracking Number: TNB021121
Annual Biosolids Report
for
Wastewater Solids Land Applied in 2019
February 3, 2020

ANNUAL REPORT

Biosolids Generated- General Information

a. Total Biosolids Land Applied in 2019: 9.15 Dry Metric Tons
b. Concentration of Metals: See attached lab report.
c. PCB Report Date: January 15, 2019
d. TCLP Report Date: January 15, 2019
e. Pathogen Reduction Process Description and Results: Pathogen reduction has been demonstrated by fecal coliform testing. The geometric mean of the density of fecal coliform in twelve samples collected was 7,780. These results meet the requirements in Appendix C of the Biosolids Permit, Class B-Alternative 1.
f. Vector Attraction Reduction Description and Results: Vector attraction reduction has been demonstrated by specific oxygen uptake rate (SOUR) testing. The average of four SOUR test results demonstrates an oxygen uptake rate of .415 mg O2/hr/g @ 20 degrees Celcius. These results meet the requirements in section 3.1.3.(d) of the Biosolids Permit.
    g. Generator Certification Statement: Under penalty of law I certify that the information that will be used to determine compliance with the Class B pathogen requirements in Appendix C and the vector attraction reduction requirements in Section 3.1.3(d) 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.

Application Sites (complete this section for each site or field)

a. Site Name: Thomas Lee Young Site
b. Site Owner: City of Baxter, TN
c. Site Operator: City of Baxter, TN
d. Applier: City of Baxter, TN
e. Latitude and Longitude of Site: 36.145556 and 85.644167
f. Street Address: 810 Elmore Town Road Baxter, TN 38544
g. County: Putnam
h. Size (acres).
    1. Approved Acres: 20 acres
    2. Applied Acres: 20 acres

i. Acres excluding setbacks: 20 acres

j. Crop Information.

1. Crop Grown: perennial grass for hay
2. Yield: about one ton per acre per cutting

k. Application Method: liquid spreader truck

l. Agronomic Rate (tons/acre) and if applicable, the cumulative loadings for each contaminant.

1. Agronomic Loading Rate: 3.60 Dry T/Acre
2. Maximum Plant Available Nitrogen (PAN) loading: 120 lbs. N/Acre
3. Loading Rate to achieve PAN: 3.60 Dry T/Acre
4. Actual application volume wet: 129,000 gallons
5. Actual application tonnage , dry: .458 Dry T/Acre
6. Total wet volume per field: 129,000 gallons
7. Total dry tons per field: 9.15 Tons

m. Nitrogen Concentrations. Report average and maximum test concentrations

1. Average Ammonia: Not Detected Maximum: Not Detected
2. Average TKN: 41,300 mg/Kg Maximum: 41,300 mg/Kg
3. Average Organic Nitrogen: 44,070 mg/Kg Maximum: 44,070 mg/Kg
4. Average Nitrate: 2,770 mg/Kg Maximum: 2,770 mg/Kg
5. Total Solids Percent: 0.60%

n. Tonnage Applied

1. Biosolids Applied to Site
    i. Total Tonnage or Volume: 129,000 gallons
    ii. Dry tons: 9.15 Tons
2. Biosolids Applied to Each Site
    i. First Application Date: June 10, 2019
    ii. Last Application Date: October 15, 2019

o. Metals See attached Lab Report

p. Management Practices. (Describe how each item below is met)

1. Set Backs: The land application of biosolids will be conducted in a manner that will not cause a violation of any receiving water quality standard from discharges of surface runoff from the land application site. There are no wetlands, seasonal surface water bodies, sink holes, wells, or biosolids storage areas on this site. The only perennial surface water body near the application site is Mine Lick Creek; this creek is located about 100 yards from the nearest land application location.
2. Agronomic Loading: Application of biosolids will be conducted in a manner that does not exceed the agronomic loading rate for available nitrogen of the crops grown on the site. The facility will provide written notification to the biosolids applier of the concentration of total nitrogen (as N on a dry weight basis) in the biosolids.
3. Weather Restrictions: Biosolids will not be applied to frozen, ice covered, or snow covered sites. When weather and/or soil conditions prevent adherence to the biosolids application procedures, biosolids will not be applied on the site.
4. Soil Restrictions: There is no standing surface water on the application site and

the groundwater level does not reach the surface of the land application site. The land application site is not subject to flooding.

5. Threatened and Endangered Species: The biosolids or the application of the biosolids will not cause or contribute to the harm of a threatened or endangered species or result in the destruction or adverse modification of critical habitat of a threatened or endangered species after application.
6. Metals Loading: Biosolids subject to the cumulative contaminant loading rate in Table 2 (subsection 3.1.1.2) will not be land applied if any of the cumulative contaminant loading rates in Table 2 have been reached.
7. Notification of Owners: The permitee will provide notice and necessary information to the person who land applies the biosolids and the owner or lease holder of the land on which the biosolids are applied.

Site Restrictions: No food crops are grown on the land application site. Hay will not be harvested from the site for 30 days after application. The public has no access to the site. Animals do not graze on the application site.

a. Certification Statement: Under penalty of law I certify that the information that will be used to determine compliance with the management practices in Section 3.2 was prepared for each site on which bulk biosolids were applied 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.

b. Certification Statement: Under penalty of law I certify that the information that will be used to determine compliance with the site restrictions in Section 3.1.2.3 for each site on which Class B biosolids were applied 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.

Tony Ard 2-3-20
chief WWTP operator

Tennessee Department of Environment and Conservation - Division of Water Pollution Control

Exhibit B - Agronomic Application Rate Calculations Based on Nitrogen (N)

Revision 05/08/14

BACKGROUND INFORMATION/QUESTIONS	FILL IN BELOW
WWTP NAME	Baxter WWTP
WWTP NPDES PERMIT NUMBER	TN0021121
SITE NAME	Thomas Lee Young
COUNTY	PUTNAM
E.A.C.	
SITE TRACKING NUMBER	TNB021121
LABORATORY NAME	Nationwide Analytical Laboratories
DATE OF ANALYSIS	1/3/19

SLUDGE/BIOSOLID ANALYSIS LABORATORY RESULTS

(Attached a copy of the laboratory analysis used for these calculations to this report)

TOTAL KJELDAHL NITROGEN (TKN)	41,300	mg/kg
AMMONIUM NITROGEN (NH_4-N)		mg/kg
NITRATE + NITRITE NITROGEN (NO_3-N + NO_2-N)	2,770	mg/kg
NITROGEN FROM SUPPLEMENTAL FERTILIZERS (If Appropriate)	0	lbs/acre
NITROGEN FROM IRRIGATION WATER (If Appropriate)	0	lbs/acre
NITROGEN FROM PREVIOUS CROP (Unless 2 is based on soil testing)	0	lbs/acre
OTHER (If Appropriate) Specify _____	0	lbs/acre

SELECT CROP TYPE (SELECT ONLY ONE)	YES
1 - CORN (GRAIN) EXPECT YIELD 100 - 125 BUSHELS	☐
2 - CORN (GRAIN) EXPECT YIELD 126 - 150 BUSHELS	☐
3 - CORN (SILAGE) EXPECT YIELD 20 TONS	☐
4 - SOYBEANS EXPECT YIELD 30 BUSHELS	☐
5 - SOYBEANS EXPECT YIELD 40 BUSHELS	☐
6- SOYBEANS EXPECT YIELD 50 BUSHELS	☐
7- WHEAT EXPECT YIELD 40 BUSHELS	☐
8 - SUMMER ANNUAL GRASS EXPECT YIELD 6 TONS (1 CUTTINGS)	☐
9 - HYBRID HAY EXPECT YIELD 8 TONS (4 CUTTINGS)	☐
10 - TALL FESCUE HAY EXPECT YIELD 3 TONS (2 CUTTINGS)	☑
11 - ORCHARD GRASS HAY EXPECT YIELD 4 TONS (2 CUTTINGS)	☐
12 - SORGHUM (GRAIN) EXPECT YIELD 60 BUSHELS	☐
13 - COTTON EXPECT YIELD 1 BALE / ACRE	☐
14 - COTTON EXPECT YIELD 1.5 BALE / ACRE	☐

CROP TYPE (LBS N/ACRE/YEAR)	120

VOLATILIZATION FACTORS K_V

(SELECT ONLY ONE)	YES
1 - ARE BIOSOLIDS LIQUID AND SURFACE APPLIED?	☑
2 - ARE BIOSOLIDS LIQUID AND INJECTED INTO SOIL?	☐
3 - ARE BIOSOLID DEWATERED AND APPLIED IN ANY MANNER?	☐

VOLATILIZATION FACTORS K_V = 0.5

MINERALIZATION RATE F_M

WHAT BIOSOLID PROCESS GENERATE THE FRACTION (F_M) OF ORGANIC NITROGEN? (SELECT ONLY ONE)	SELECT PROCESS
NONE (Unstabilized)	☐
ALKALINE STABILIZATION	☐
AEROBIC DIGESTION	☑
ANAEROBIC DIGESTION	☐
COMPOSING	☐

SELECTION CHOICE: 1 SELECTED

MINERALIZATION RATE F_M = 0.3

AGRONOMIC LOADING RATE 3.6 tons/acre

Calculated Results

Analyte	Result (wet) mg/kg	RDL (Wet) mg/kg	Result (dry) mg/kg	RDL (dry) mg/kg	Qualifier	Dilution	Analysis date / time	Batch
Organic Nitrogen	248	5.00	41300	833		1	01/09/2019 14:13	WG1220476

Gravimetric Analysis by Method 160.4/2540G

Analyte	Result % of TS	Qualifier	Dilution	Analysis date / time	Batch
Volatile Solids	69.0		1	01/08/2019 16:59	WG1220384

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	0.600		1	01/05/2019 12:29	WG1219564

Wet Chemistry by Method 350.1

Analyte	Result (wet) mg/kg	RDL (Wet) mg/kg	Result (dry) mg/kg	RDL (dry) mg/kg	Qualifier	Dilution	Analysis date / time	Batch
Ammonia Nitrogen	ND	5.00	ND	833		1	01/09/2019 14:13	WG1220476

Wet Chemistry by Method 4500NOrg C-2011

Analyte	Result (wet) mg/kg	RDL (Wet) mg/kg	Result (dry) mg/kg	RDL (dry) mg/kg	Qualifier	Dilution	Analysis date / time	Batch
Kjeldahl Nitrogen, TKN	248	20.0	41300	3330	J3 J5 J6	1	01/07/2019 12:33	WG1219884

Wet Chemistry by Method 9056A

Analyte	Result (wet) mg/kg	RDL (Wet) mg/kg	Result (dry) mg/kg	RDL (dry) mg/kg	Qualifier	Dilution	Analysis date / time	Batch
Nitrate	16.6	1.00	2770	167		1	01/09/2019 16:16	WG1220342
Nitrite	ND	1.00	ND	167		1	01/09/2019 16:16	WG1220342
Phosphate as P	17.4	1.00	2910	167		1	01/09/2019 16:16	WG1220342

Mercury by Method 7471A

Analyte	Result (wet) mg/kg	RDL (Wet) mg/kg	Result (dry) mg/kg	RDL (dry) mg/kg	Qualifier	Dilution	Analysis date / time	Batch
Mercury	ND	0.0200	ND	3.33		1	01/07/2019 08:53	WG1219876

Metals (ICP) by Method 6010B

Analyte	Result (wet) mg/kg	RDL (Wet) mg/kg	Result (dry) mg/kg	RDL (dry) mg/kg	Qualifier	Dilution	Analysis date / time	Batch
Arsenic	ND	0.200	ND	33.3		1	01/07/2019 15:41	WG1219804
Cadmium	ND	0.0500	ND	8.33		1	01/07/2019 15:41	WG1219804
Copper	2.19	0.200	365	33.3		1	01/07/2019 15:41	WG1219804
Lead	0.0944	0.0500	15.7	8.33		1	01/07/2019 15:41	WG1219804
Molybdenum	ND	0.0500	ND	8.33		1	01/07/2019 15:41	WG1219804
Nickel	ND	0.200	ND	33.3		1	01/07/2019 15:41	WG1219804
Selenium	ND	0.200	ND	33.3		1	01/07/2019 15:41	WG1219804
Zinc	5.22	0.500	870	83.3		1	01/07/2019 15:41	WG1219804

Pace Analytical®
National Center for Testing & Innovation

ANALYTICAL REPORT

January 15, 2019

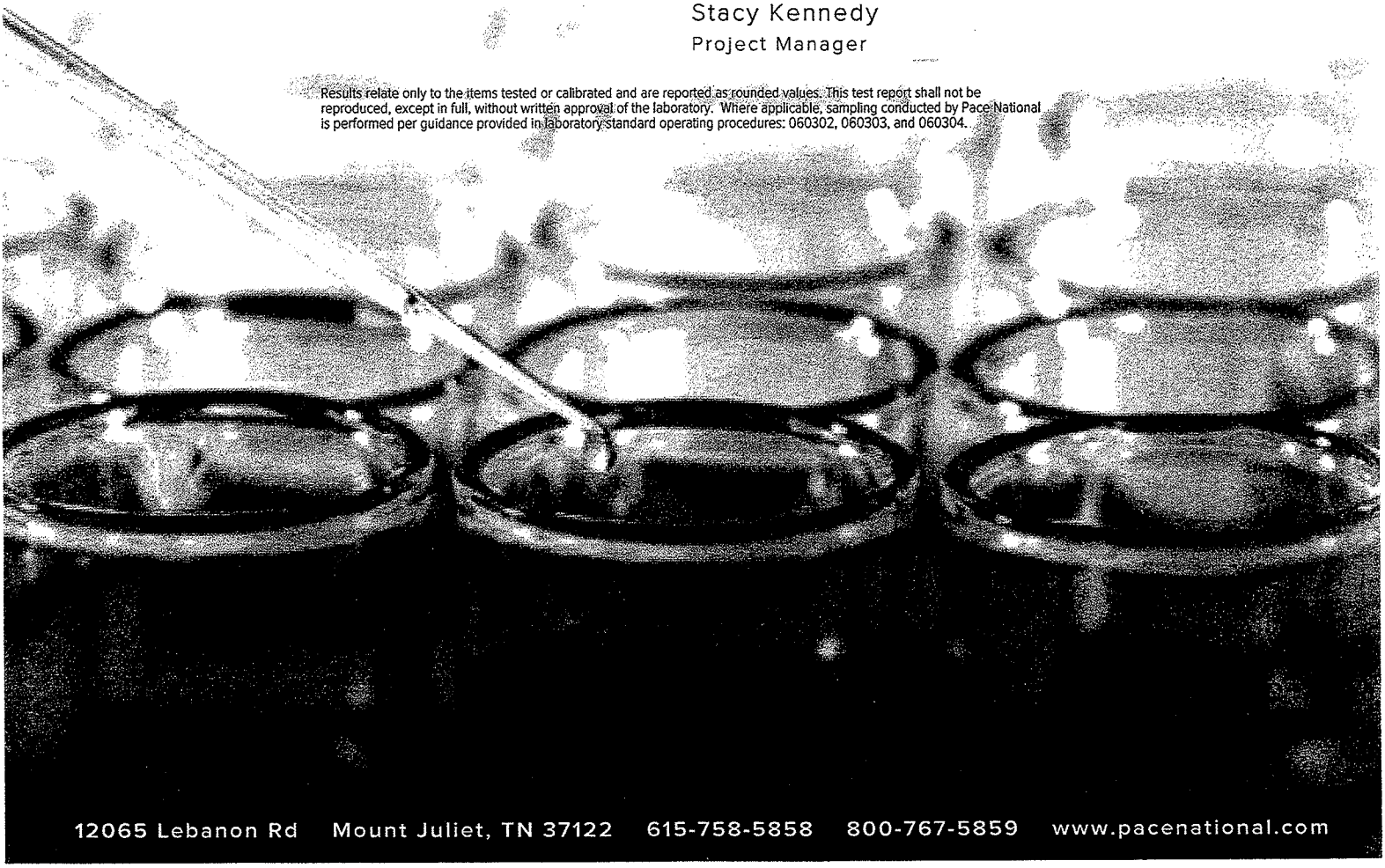
City of Baxter WWTP

Sample Delivery Group:	L1058224
Samples Received:	01/04/2019
Project Number:	TCLP/PCB
Description:	
Site:	TN0021121
Report To:	Mr. Tommy Buford PO Box 283 Baxter, TN 38544

Entire Report Reviewed By:

Stacy Kennedy

Stacy Kennedy
Project Manager



Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
	%				
Total Solids	0.580		1	01/08/2019 18:11	WG1220604

Polychlorinated Biphenyls (GC) by Method 8082

Analyte	Result (wet)	RDL (Wet)	Result (dry)	RDL (dry)	Qualifier	Dilution	Analysis date / time	Batch
	mg/kg	mg/kg	mg/kg	mg/kg				
PCB 1016	ND	0.265	ND	45.7		15.6	01/06/2019 09:39	WG1219737
PCB 1221	ND	0.265	ND	45.7		15.6	01/06/2019 09:39	WG1219737
PCB 1232	ND	0.265	ND	45.7		15.6	01/06/2019 09:39	WG1219737
PCB 1242	ND	0.265	ND	45.7		15.6	01/06/2019 09:39	WG1219737
PCB 1248	ND	0.265	ND	45.7		15.6	01/06/2019 09:39	WG1219737
PCB 1254	ND	0.265	ND	45.7		15.6	01/06/2019 09:39	WG1219737
PCB 1260	ND	0.265	ND	45.7		15.6	01/06/2019 09:39	WG1219737
(S) Decachlorobiphenyl	*96.2*			*10.0-135*			*01/06/2019 09:39*	WG1219737
(S) Tetrachloro-m-xylene	*91.6*			*10.0-139*			*01/06/2019 09:39*	WG1219737

Cp
Tc
Ss
Cn
Sr
Qc
Gl
Al
Sc

Preparation by Method 1311

Analyte	Result	Qualifier	Prep date / time	Batch
TCLP Extraction	-		1/7/2019 10:19:19 AM	WG1220097
TCLP ZHE Extraction	-		1/7/2019 1:19:12 PM	WG1220169
Fluid	1		1/7/2019 10:19:19 AM	WG1220097
Initial pH	6.97		1/7/2019 10:19:19 AM	WG1220097
Final pH	4.81		1/7/2019 10:19:19 AM	WG1220097

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	RDL mg/l	Limit mg/l	Dilution	Analysis date / time	Batch
Mercury	ND		0.0100	0.20	1	01/08/2019 13:54	WG1220346

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Limit mg/l	Dilution	Analysis date / time	Batch
Arsenic	ND		0.100	5	1	01/09/2019 11:02	WG1220385
Barium	0.123		0.100	100	1	01/09/2019 11:02	WG1220385
Cadmium	ND		0.100	1	1	01/09/2019 11:02	WG1220385
Chromium	ND		0.100	5	1	01/09/2019 11:02	WG1220385
Lead	ND		0.100	5	1	01/09/2019 11:02	WG1220385
Selenium	ND		0.100	1	1	01/09/2019 11:02	WG1220385
Silver	ND		0.100	5	1	01/09/2019 11:02	WG1220385

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/l	Qualifier	RDL mg/l	Limit mg/l	Dilution	Analysis date / time	Batch
Benzene	ND		0.0500	0.50	1	01/08/2019 14:38	WG1220424
Carbon tetrachloride	ND		0.0500	0.50	1	01/08/2019 14:38	WG1220424
Chlorobenzene	ND		0.0500	100	1	01/08/2019 14:38	WG1220424
Chloroform	ND		0.250	6	1	01/08/2019 14:38	WG1220424
1,2-Dichloroethane	ND		0.0500	0.50	1	01/08/2019 14:38	WG1220424
1,1-Dichloroethene	ND		0.0500	0.70	1	01/08/2019 14:38	WG1220424
2-Butanone (MEK)	ND		0.500	200	1	01/08/2019 14:38	WG1220424
Tetrachloroethene	ND		0.0500	0.70	1	01/08/2019 14:38	WG1220424
Trichloroethene	ND		0.0500	0.50	1	01/08/2019 14:38	WG1220424
Vinyl chloride	ND		0.0500	0.20	1	01/08/2019 14:38	WG1220424
(S) Toluene-d8	*107*		*80.0-120*			*01/08/2019 14:38*	WG1220424
(S) Dibromofluoromethane	*87.9*		*75.0-120*			*01/08/2019 14:38*	WG1220424
(S) a,a,a-Trifluorotoluene	*106*		*80.0-120*			*01/08/2019 14:38*	WG1220424
(S) 4-Bromofluorobenzene	*111*		*77.0-126*			*01/08/2019 14:38*	WG1220424

Chlorinated Acid Herbicides (GC) by Method 8151A

Analyte	Result mg/l	Qualifier	RDL mg/l	Limit mg/l	Dilution	Analysis date / time	Batch
2,4,5-TP (Silvex)	ND		0.00200	1	1	01/09/2019 14:49	WG1220908
2,4-D	ND		0.00200	10	1	01/09/2019 14:49	WG1220908
(S) 2,4-Dichlorophenyl Acetic Acid	*93.4*		*14.0-158*			*01/09/2019 14:49*	WG1220908

Pesticides (GC) by Method 8081B

Analyte	Result mg/l	Qualifier	RDL mg/l	Limit mg/l	Dilution	Analysis date / time	Batch
Chlordane	ND		0.00500	0.03	1	01/10/2019 18:36	WG1220678
Endrin	ND		0.00500	0.02	1	01/10/2019 18:36	WG1220678
Heptachlor	ND		0.00500	0.0080	1	01/10/2019 18:36	WG1220678

Pesticides (GC) by Method 8081B

Analyte	Result mg/l	Qualifier	RDL mg/l	Limit mg/l	Dilution	Analysis date / time	Batch
Lindane	ND		0.00500	0.40	1	01/10/2019 18:36	WG1220678
Methoxychlor	ND		0.00500	10	1	01/10/2019 18:36	WG1220678
Toxaphene	ND		0.0100	0.50	1	01/10/2019 18:36	WG1220678
(S) Decachlorobiphenyl	*100*		*10.0-128*			*01/10/2019 18:36*	WG1220678
(S) Tetrachloro-m-xylene	*98.1*		*10.0-127*			*01/10/2019 18:36*	WG1220678

Semi Volatile Organic Compounds (GC/MS) by Method 8270C

Analyte	Result mg/l	Qualifier	RDL mg/l	Limit mg/l	Dilution	Analysis date / time	Batch
1,4-Dichlorobenzene	ND		0.100	7.50	1	01/09/2019 23:05	WG1220676
2,4-Dinitrotoluene	ND		0.100	0.13	1	01/09/2019 23:05	WG1220676
Hexachlorobenzene	ND		0.100	0.13	1	01/09/2019 23:05	WG1220676
Hexachloro-1,3-butadiene	ND		0.100	0.50	1	01/09/2019 23:05	WG1220676
Hexachloroethane	ND		0.100	3	1	01/09/2019 23:05	WG1220676
Nitrobenzene	ND		0.100	2	1	01/09/2019 23:05	WG1220676
Pyridine	ND		0.100	5	1	01/09/2019 23:05	WG1220676
3&4-Methyl Phenol	ND		0.100	400	1	01/09/2019 23:05	WG1220676
2-Methylphenol	ND		0.100	200	1	01/09/2019 23:05	WG1220676
Pentachlorophenol	ND		0.100	100	1	01/09/2019 23:05	WG1220676
2,4,5-Trichlorophenol	ND		0.100	400	1	01/09/2019 23:05	WG1220676
2,4,6-Trichlorophenol	ND		0.100	2	1	01/09/2019 23:05	WG1220676
(S) 2-Fluorophenol	*32.3*		*10.0-120*			*01/09/2019 23:05*	WG1220676
(S) Phenol-d5	*18.1*		*10.0-120*			*01/09/2019 23:05*	WG1220676
(S) Nitrobenzene-d5	*42.4*		*10.0-127*			*01/09/2019 23:05*	WG1220676
(S) 2-Fluorobiphenyl	*39.6*		*10.0-130*			*01/09/2019 23:05*	WG1220676
(S) 2,4,6-Tribromophenol	*38.2*		*10.0-155*			*01/09/2019 23:05*	WG1220676
(S) p-Terphenyl-d14	*44.6*		*10.0-128*			*01/09/2019 23:05*	WG1220676

Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Biosolid Pathogen Worksheet

Class B Fecal Coliform
Liquid sample < 7% solids, for solid samples see p 138 of Whitehouse Manual 1999 edition
Membrane filter, SM 9222 D

Sample location DIS #1 Date 9-24-19 Sample Time 0838
Analyst AB Incubator Time IN 0912 OUT 0900 9-25-19

Dilution A: To 99 ml of sterile dilution water add 1ml of sample = 0.01 ml original sample / ml
Dilution B: To 99 ml of sterile dilution water add 1.0 ml of dilution A = 0.0001 ml original sample / ml
Dilution C: To 99 ml of sterile dilution water add 1.0 ml of dilution B = 0.000001 ml original sample / ml

Filter Number	Volume and Dilution	ml of original sample
Filter 1	1.0 ml dilution A	0.01
Filter 2	10 ml Dilution B	0.001
Filter 3	1.0 ml Dilution B	0.0001
Filter 4	10 ml Dilution C	0.00001

If needed adjust volumes and dilutions to produce 20-60 colonies per membrane filter
Use the same counting rules that apply to effluent Fecal Coliform

Calculations of total solids see SM 2540 G.

$$\text{CFU / gram} = \frac{\text{Colonies Counted}}{\text{ml of original sample} * \% \text{ total solids as decimal}}$$

Note: Test fails if CFU/gram >2,000,000

Filter 1 CFU / gram = $\frac{2}{0.01 \times (.0194} = 10,309$

Filter 2 CFU / gram = $\frac{ND}{0.001 \times (.0194}$

Filter 3 CFU / gram = $\frac{ND}{0.0001 \times (.0194}$

Filter 4 CFU / gram = $\frac{ND}{0.00001 \times (.0194}$

ND = NOT DETECTED

References: Standard Methods for the examination of Water and Wastewater
18 th Edition

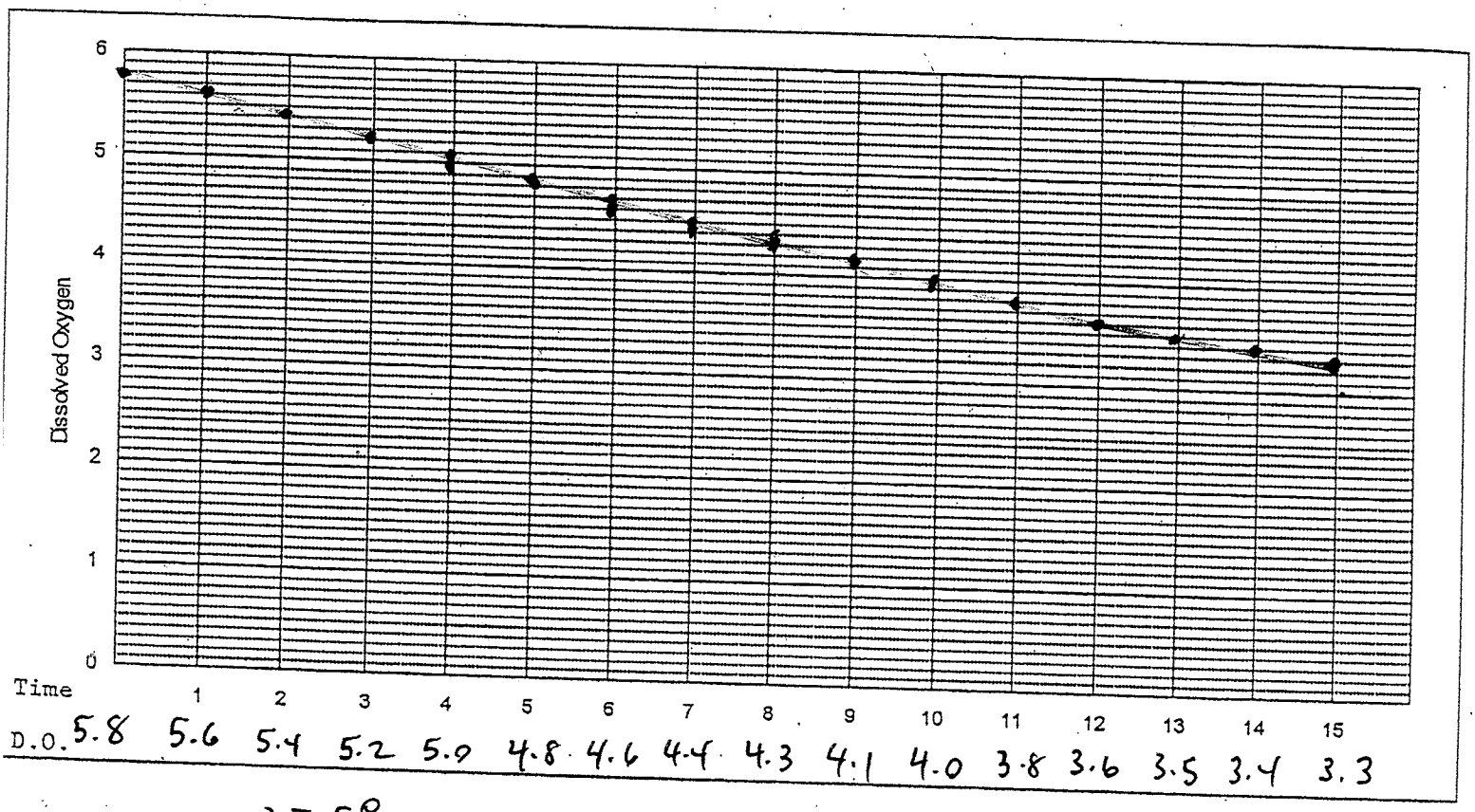
Environmental Regulations and Technology, Control of pathogens and Vector attraction in Sewage Sludge. (Whitehouse Book) Page 103-104, 1992 edition, pp.138-138,1999 edition

Revised 3-01

2019-3

Specific Oxygen Uptake Rate
SOUR

Date 9-23-19 Sample Location DIS #1 Temperature 25.00°C
Time 1016



Begin Temp 25.5°C Average Temp 25°C End Temp 24.5°C

Enter D.O. readings at each elapsed minute on the graph.
Graph the data and determine the time period where the slope is constant with a best fit line.
Use the first and last D.O. reading from this constant slope portion of the graph in the OUR formula.

Oxygen Uptake Rate (OUR) (S.M. 2710B)

$$\text{OUR mg } O_2\text{/L/hr} = \frac{\text{Begin Dissolved Oxygen - End Dissolved Oxygen}}{\text{Elapsed Time}} * 60$$

$$\text{OUR} = \frac{5.8 \text{ mg/L} - 3.3 \text{ mg/l}}{15 \text{ Minutes}} * 60 = 10 \text{ mg } O_2\text{/L/hr}$$

Specific Oxygen Uptake Rate (SOUR)

1. SOUR mg O_2/hr/g = $\frac{\text{OUR mg } O_2 \text{ /L/hr}}{\text{\% Total Solids} * 1000 \text{ g/L}}$

Note: enter total solids as a decimal, see S.M. 2540 G

SOUR = $\frac{10 \text{ mg } O_2\text{/L/hr}}{.0194 * 1000 \text{ g/L}} = \frac{.515 \text{ mg } O_2\text{/hr/g}}{}$

Temperature Adjustment

SOUR @ Average Temp * Adjustment, or correction factor = SOUR @ 20° C

.515 mg O_2/ hr/g @ 25 °C * .78 = .4017 mg O_2/hr/g @ 20° C

Note: See adjustment formula and correction factors on the next page.

Brett Ward
Municipal Technical Advisory Service

Specific Oxygen Uptake Rate

Temperature Adjustment

SOUR is determined at the digester's ambient temperature and then adjusted as follows.

$$SOUR@20°C = SOUR @ \text{Ambient Temp.} * A^{(20-\text{Ambient temp.})}$$

Where A = 1.05 above 20°
= 1.07 below 20°
These factors are good between 10° C and 30° C

Simplified

SOUR @20° C = SOUR @ Ambient Temp. * Correction

$$\text{Correction} = A^{(20-\text{Ambient Temp})}$$

Temp° C	Correction
10	1.97
11	1.84
12	1.72
13	1.60
14	1.50
15	1.40
16	1.31
17	1.22
18	1.14
19	1.07
20	1.00
21	0.95
22	0.90
23	0.86
24	0.82
25	0.78
26	0.75
27	0.71
28	0.68
29	0.64
30	0.61

Municipal Technical Advisory Service
Brett Ward

Sludge Total and Volatile Solids
Total Solids see S.M. 2540 G

Date 9-23-19 Sample Location D.G #1 Sampler TB
Time 1016
Test Time 1020

Weight of Dish A = 84.2044

Weight of Dish and Wet Sludge B= 108.8440

Weight of Wet Sludge C= 24.6396

Weight after Drying D= 84.6812

Weight after Ignition E= NA

% Solids = (D-A) *100
(B-A)

%Total Solids = (84.6812 - 84.2044) = (.4768) = .0194*100 = 1.94%
(108.8440-84.2044) (24.6396)

% Volatile = (D-E) * 100
(C-A)

% Volatile = (-) = ( ) = *100
(-) ( )

Metric Tons = gallons * 8.34 * Total Solids as a decimal
2205

Biosolid Pathogen Worksheet

Class B Fecal Coliform
Liquid sample < 7% solids, for solid samples see p 138 of Whitehouse Manual 1999 edition
Membrane filter, SM 9222 D

Sample location Dig #2 Date 9-24-19 Sample Time 0916
Analyst AB Incubator Time IN 0933 OUT 0900 9-25-19

Dilution A: To 99 ml of sterile dilution water add 1ml of sample = 0.01 ml original sample / ml
Dilution B: To 99 ml of sterile dilution water add 1.0 ml of dilution A = 0.0001 ml original sample / ml
Dilution C: To 99 ml of sterile dilution water add 1.0 ml of dilution B = 0.000001 ml original sample / ml

Filter Number	Volume and Dilution	ml of original sample
Filter 1	1.0 ml dilution A	0.01
Filter 2	10 ml Dilution B	0.001
Filter 3	1.0 ml Dilution B	0.0001
Filter 4	10 ml Dilution C	0.00001

If needed adjust volumes and dilutions to produce 20-60 colonies per membrane filter
Use the same counting rules that apply to effluent Fecal Coliform

Calculations of total solids see SM 2540 G.

$$\text{CFU / gram} = \frac{\text{Colonies Counted}}{\text{ml of original sample} * \%\text{ total solids as decimal}}$$

Note: Test fails if CFU/gram >2,000,000

Filter 1 CFU / gram = $\frac{1}{0.01 \times (.017)} = 5,882$

Filter 2 CFU / gram = $\frac{ND}{0.001 \times (.017)}$

Filter 3 CFU / gram = $\frac{ND}{0.0001 \times (.017)}$

Filter 4 CFU / gram = $\frac{ND}{0.00001 \times (.017)}$

ND = NOT DETECTED

References: Standard Methods for the examination of Water and Wastewater
18 th Edition

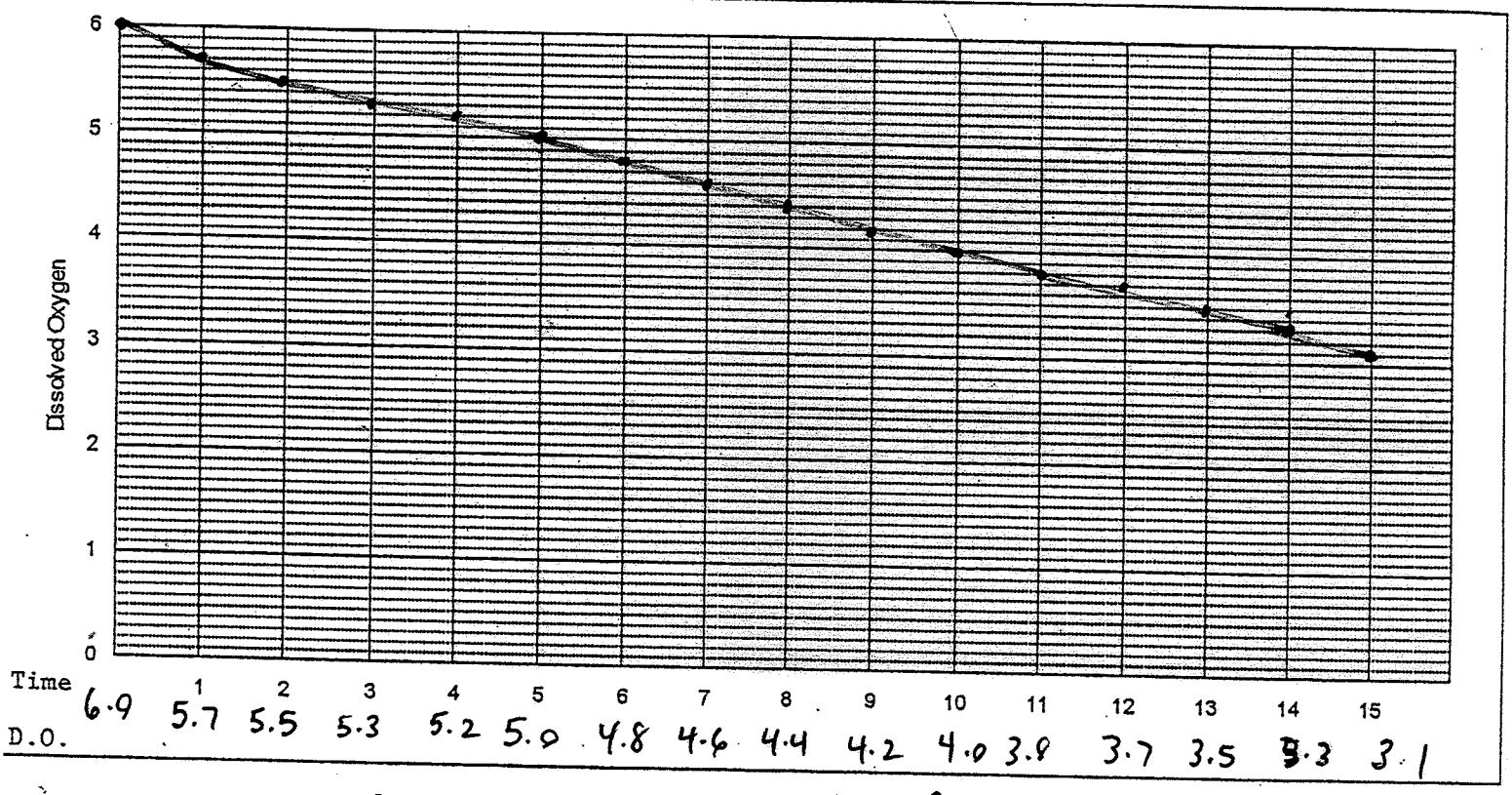
Environmental Regulations and Technology, Control of pathogens and Vector attraction in Sewage Sludge. (Whitehouse Book) Page 103-104, 1992 edition, pp.138-138,1999 edition

Revised 3-01

2019-4

Specific Oxygen Uptake Rate
SOUR

Date 9-23-19 Sample Location Dig #2 Temperature 25 °C
Time 1304



Time	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
D.O.	6.9	5.7	5.5	5.3	5.2	5.0	4.8	4.6	4.4	4.2	4.0	3.8	3.7	3.5	3.3	3.1

Begin Temp 25.3 °C Average Temp 25 °C End Temp 24.7 °C

Enter D.O. readings at each elapsed minute on the graph.
Graph the data and determine the time period where the slope is constant with a best fit line.
Use the first and last D.O. reading from this constant slope portion of the graph in the OUR formula.

Oxygen Uptake Rate (OUR) (S.M. 2710B)

$$\text{OUR mg } O_2\text{/L/hr} = \frac{\text{Begin Dissolved Oxygen - End Dissolved Oxygen}}{\text{Elapsed Time}} * 60$$

$$\text{OUR} = \frac{6.0 \text{ mg/L} - 3.1 \text{ mg/l}}{15 \text{ Minutes}} * 60 = 11.6 \text{ mg } O_2\text{/L/hr}$$

Specific Oxygen Uptake Rate (SOUR)

1. SOUR mg O_2/hr/g = $\frac{\text{OUR mg } O_2 \text{ /L/hr}}{\text{\% Total Solids} * 1000 \text{ g/L}}$

Note: enter total solids as a decimal, see S.M. 2540 G

SOUR = $\frac{11.6 \text{ mg } O_2\text{/L/hr}}{.017 * 1000 \text{ g/L}}$ = .6824 mg O_2/hr/g

Temperature Adjustment

SOUR @ Average Temp * Adjustment, or correction factor = SOUR @ 20° C

.6824 mg O_2/ hr/g @ 25 °C * .78 = .5323 mg O_2/hr/g @ 20° C

Note: See adjustment formula and correction factors on the next page.

Brett Ward
Municipal Technical Advisory Service

Specific Oxygen Uptake Rate

Temperature Adjustment

SOUR is determined at the digester's ambient temperature and then adjusted as follows.

$$SOUR@20°C = SOUR @ \text{Ambient Temp.} * A^{(20-\text{Ambient temp.})}$$

Where A = 1.05 above 20°
= 1.07 below 20°
These factors are good between 10° C and 30° C

Simplified

SOUR @20° C = SOUR @ Ambient Temp. * Correction

$$\text{Correction} = A^{(20-\text{Ambient Temp})}$$

Temp° C	Correction
10	1.97
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30	0.61

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Brett Ward

Sludge Total and Volatile Solids
Total Solids see S.M. 2540 G

Date 9-23-19 Sample Location Dig #2 Sampler TB
Time 1304
Test Time 1319

Weight of Dish A = 47.4375

Weight of Dish and Wet Sludge B= 72.4747

Weight of Wet Sludge C= 25.0372

Weight after Drying D= 47.8643

Weight after Ignition E= NA

% Solids = (D-A) *100
(B-A)

%Total Solids = (47.8643 - 47.4375) = (.4268) = .0170 *100 = 1.70 %
(72.4747 - 47.4375) (25.0372)

% Volatile = (D-E) * 100
(C-A)

% Volatile = (-) = ( ) = * 100
(-) ( )

Metric Tons = gallons * 8.34 * Total Solids as a decimal
2205