

Attachment B

Biosolid Analysis Year **2017**

Source	Lab analysis #	Neilson	Date
File No.			
Phone No.	503-777-2909		
Contact	John Huntington		
	Qrt 1	Qrt 2	Qrt 3
			Qrt 4
			Ave
% Total Solids	2.9		2.9
% Volatile Solids	62		62.0
pH	12		12.0
TKN	3.9		3.9
NH3	0.32		0.3
NO3	0.02		0.0
Phosphorus	1.1		1.1
Potassium	0.34		0.3
Arsenic	2.1		2.1
Cadmium	0.9		0.9
Chromium	9.58		9.6
Copper	110		110.0
Lead	31.9		31.9
Mercury	0.255		0.3
Molybdenum*	3.18		3.2
Nickel	11.5		11.5
Selenium*	5.38		5.4
Zinc	345		345.0
Silver	0		0.0

Nutrient and metals analysis are an average of representative sampling events taken over the year biosolids are land applied.

Nutrient and metal concentrations are determined from the current year's representative solids analysis.

Site loading rates for nutrients and metal must be adjusted based on current analysis to meet authorized site loading rates.

COLOR KEY

Requires entered value

calculated value
 replace 1 with coefficient from selection

SOLIDS ANALYSIS

Cake Biosolid	1	0.85	Replace the 1 with the appropriate decimal
Liquid Biosolid	0.5	0.5	Dewater (10-50%) and Liquid
% Total Solids	2.90		
% Volatile Solids	62.00		

PATHOGEN REDUCTION

Class A Biosolid			Put X next to Class A if true
Class B Biosolid		X	Put X next to Class B if true
	1		Cite 503.32 Alternative

Fecal Coliform <2,000,000 /dry gr. Total Solids
 org.-100ml/1 dry gr.

VECTRO ATTRACTION REDUCTION (DIGESTION METHOD)

Volatile Solids Reduction Method 1 Cite 503.33 Option

Source 2017
 File No. Otter Crest
 0

VOLATILE SOLIDS REDUCTION (DIGESTION METHOD)

Volatile Solids Reduction Method 1 Cite 503.33 option

Anaerobic D.	0.2	0.2	Replace the 1 with the appropriate decimal
Aerobic D.	1	0.3	Replace the 1 with the appropriate decimal
Drying Bed Gal/yr.	1	0.15	Replace the 1 with the appropriate decimal
	22,000		

* Note If cake biosolids are generated then is total cubic yards instead of total gallons
 Note biosolid cake conversion is 0.65 ton/ yd³
 Pounds Equation

Dry TS US ton/yr.
 lb. TS/yr.

2.66046
 5321

lb. TS/yr. = %TS x 8.34 x gal/yr.

 0	Cubic yards hauled
 0	Total US tons
 0	

Total US tons **2.66** **0**

Conversion

US-> Metric tons multiply by 1.11

Metric -> US tons multiply by 0.9

Total Metric tons **2.394414**

NUTRIENT ANALYSIS

	%	mg/kg dry-wt.		
Total Organic	3.58	35800	Organic N = (%TKN-%NH4)	
TKN	3.90	39000	Inorganic N = (%NH4 + %NO3)	
NH4	0.32	3200		
NO3	0.02	200		
Phosphorus	1.10	11000		
Potassium	0.34	3400		
	mg/kg dry-wt.	lb. / yr.	lb./ac-yr.	kg/ha
Phosphorus	11000.00	58.53	11.71	13.11
Potassium	3400.00	18.09	3.62	4.05

pH **12.00**

Source **2017**
 File No. **Otter Crest**
41740

NITROGEN	mg/kg dry-wt.	lb. / yr.	lb./ac-yr.	kg/ha
Total Organic	3.58	38.0978	7.62	8.53
TKN	3.9	41.5032	41.50	46.48
NH4	0.32	8.5135	1.70	1.91
NO3	0.02	1.0642	0.21	0.24
lb. mineralized organic N/dry ton			14.32	
lb. inorganic N/dry ton			0.72	
Total lb. available N/ ton			15.040	

NUTRIENT LOADING

Crop nitrogen loading rate N lb./acre **100** **112** kg/ha

Total acres land applied for year.	5	
Number dry tons land applied per acre	0.53	1.19 metric ton/ha
lb. Nitrogen per dry ton	17.92	
Total lb. Org-N produced per year	38.10	
Total lb. NH4 produced per year	8.51	
Total lb. NO3 produced per year	1.06	#DIV/0! lb. N / yd ³
Total lb. Available N per year	47.68	0.00 lb. N / gallon
Min. number of acres required per year (Nitrogen)	0.48	

Source 2017
 File No. Otter Crest 41470

LAND APPLICATION EQUIPMENT

Liquid		Cake	
Truck #	Tank Capacity	Truck #	Truck yd ³
Truck 1	1000	Truck 3	5
Truck 2	2500	Truck 4	10

SITE LAND APPLICATION

Liquid Site Name	Location	Acres	Approved lb. N/ac required for Crop	Max. lb. N/site	Max. gal./ site	Max. gallons /ac
A		0	100	0	0	#DIV/0!

Ib. N/ Truck 1	Truck 1 loads/site	Truck 1 loads/ac	Truck 2 Ib. N/	Truck 2 loads/site	Truck 2 loads/ac
2.2	0.0	#DIV/0!	5.4177	0.0	#DIV/0!

Site Name	Location	Acres	Approved Ib. N/ac required for Crop	Max. Ib. N/site	Max. gal./ site	Max. gallons /ac
B		0	100	0	0	#DIV/0!

Ib. N/ Truck 1	Truck 1 loads/site	Truck 1 loads/ac	Truck 2 Ib. N/	Truck 2 loads/site	Truck 2 loads/ac
2.2	0.0	#DIV/0!	5.4177	0.0	#DIV/0!

Site Name	Location	Acres	Approved Ib. N/ac required for Crop	Max. Ib. N/site	Max. gal./ site	Max. gallons /ac
C		0	100	0	0	#DIV/0!

Ib. N/ Truck 1	Truck 1 loads/site	Truck 1 loads/ac	Truck 2 Ib. N/	Truck 2 loads/site	Truck 2 loads/ac
2.2	0.0	#DIV/0!	5.4177	0.0	#DIV/0!

Source
File No. 2017
Otter Crest
0

Site Name	Truck Cap. Gal	Trucks loads	Total Ib. N applied	Total gal. applied		
A	0	0	0	0		
C	0	0	0	0		
C	0	0	0	0	Total gallons hailed yr.	Total Ib. Nitrogen in biosolids/yr
TOTALS			0	0	22000	47.68

BIOSOLID METALS ANALYSIS AND CALCULATIONS

Sample calculation:

$(((5.0 \text{ mg As}/1000000 \text{ mg TS}) \times 140000 \text{ lb. Total Solids}) = 0.07 \text{ lb. As/yr.}$

$(((5.0 \text{ mg As}/ 1000000 \text{ mg TS}) \times 140000 \text{ lb. TS}) / 52 \text{ ac} = 0.013 \text{ lb. As/ac-yr.}$

$(\text{EPA cumulative loading } 41 \text{ total lb. As/ac} / 0.013 \text{ lb. As/ac/yr.}) = 2719.3 \text{ yr. site life for As}$

$(0.013 \text{ lb. As/ac-yr.}) \times 1.12 \text{ conversion factor} = 0.015 \text{ kg/ha-yr.}$

$(2.6 \text{ tons biosolid is equivalent to a loading rate of } 100 \text{ lb. total available N/ac}) .$

Metal Analysis	mg/kg dry-wt.
Arsenic	2.1
Cadmium	0.9
Chromium	9.58
Copper	110
Lead	31.9
Mercury	0.255
Molybdenum	3.18
Nickel	11.5
Selenium	5.38
Zinc	345
Silver	0
	2017
Source	Otter Crest
File No.	41740

pg 6/7

Metals	Biosolid concentrator mg/kg	Ceiling Limits 503.13 Table 1 Conc. mg/kg	Ceiling Limits 503.13 Table 1 metal lb./ton biosolid	Yearly Metal lbs. per ton biosolid	Yearly Loading lb./ac-yr.	Yearly Loading kg/ ha-yr.
Arsenic	2.1	75	84	0.004	0.00223	0.003
Cadmium	0.9	85	95	0.002	0.00096	0.001
Chromium	9.58	1200	1344	0.019	0.01019	0.011
Copper	110	4300	4816	0.220	0.11706	0.131
Lead	31.9	840	941	0.064	0.03395	0.038
Mercury	0.255	57	64	0.001	0.00027	0.000
Molybdenum	3.18	75	84	0.006	0.00338	0.004
Nickel	11.5	420	470	0.023	0.01224	0.014

Selenium	5.38	100	112	0.011	0.00573	0.006
Zinc	345	7500	8400	0.690	0.36714	0.411

There is no Ceiling limit for Chromium, table value is a past limit that is no longer valid, used here for loading calculations only.

	Analysis Biosolid conc. mg/kg	Cumulative Pollutant Limits		Otter Crest Yearly lb. Metal per ton biosolids	Otter Crest Biosolid Loading lb./ac-yr.	Biosolid Loading kg/ha-yr.
		CFR 503.13 Table 2 mg/ha	40 CFR 503.13 Table 2 metal lb./ac biosolid			
Metals						
<i>Arsenic</i>	2.1	41	46	0.004	0.00223	0.003
<i>Cadmium</i>	0.9	39	44	0.002	0.00096	0.001
<i>Chromium</i>	9.58	1200	1344	0.019	0.01019	0.011
<i>Copper</i>	110	1500	1680	0.220	0.11706	0.131
<i>Lead</i>	31.9	300	336	0.064	0.03395	0.038
<i>Mercury</i>	0.255	17	19	0.001	0.00027	0.000
<i>Molybdenum</i>	3.18	75	84	0.006	0.00338	0.004
<i>Nickel</i>	11.5	420	470	0.023	0.01224	0.014
<i>Selenium</i>	5.38	100	112	0.011	0.00573	0.006
<i>Zinc</i>	345	2800	3136	0.690	0.36714	0.411

There are no limits for Chromium or Molybdenum under Table 2, Mo concentration comes from Table 1. Ceiling Limit.

Source
File No. 2017
Otter Crest
41740

pg 7/7

Metals	Biosolid Analysis mg/kg	EPA Table 3 Pollutant Conc. Limits mg/ha	EPA Table 3 Pollutant Metal lbs/ac biosolid	Otter Crest Loading lb./ac-yr.	Loading kg/ha-yr.	Site Life in years
<i>Cadmium</i>	0.9	39	44	0.0010	0.001	36357
<i>Chromium</i>	9.58	1200	1344	0.0102	0.011	105095
<i>Copper</i>	110	1500	1680	0.1171	0.131	11441
<i>Lead</i>	31.9	300	336	0.0339	0.038	7890
<i>Mercury</i>	0.255	17	19	0.0003	0.000	55934
<i>Molybdenum</i>	3.18	75	84	0.0034	0.004	19788

