Biosolid Analysis Year 2017

Source	Newport	**Lab analysis #**	1702809	**Date**	3/7/2017
File No.	111142		Neilson Lab		
Phone No.	541-574-3371				
Contact	Andrew Grant				
	Tyson Arrant				

Nutrient and metals analysis are a representative sampling taken for the year's 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	0.85	**0.85**	**Replace the 1 with the appropriate decimal**
Liquid Biosolid	1	**0.5**	**Dewater (10-50%) and Liquid**
% Total Solids	32		
% Volatile Solids	1		

PATHOGEN REDUCTION

Class A Biosolid		X	**Put X next to Class A if true**
Class B Biosolid			**Put X next to Class B if true**
	a2 PFRP #7		**Cite 503.32 Alternative**

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

VECTOR ATTRACTION REDUCTION (DIGESTION METHOD)

Volatile Solids Reduction Method		b 6 and 12	**Cite 503.33 Option**

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VOLATILE SOLIDS REDUCTION (DIGESTION METHOD)

Volatile Solids Reduction Method **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	1	0.15	Replace the 1 with the appropriate decimal
Gal/yr.	0		

*** Note If cake biosolids are generated then is total cubic yards instead of total gallons**
Note biosolid cake conversion is 0.65 ton/ yd^3

Pounds Equation

			0	**Cubic yards hauled**
Dry TS US ton/yr.	300000.00	**lb. TS/yr. = %TS x 8.34 x gal/yr.**	513	**Total US tons**
lb. TS/yr.	0		1026000	
Total US tons	**0**		**513**	

Conversion

US-> Metric tons multiply by 1.11 **Total Metric tons** 0.23

Metric -> US tons multiply by 0.9

NUTRIENT ANALYSIS

	mg/kg	mg/kg dry-wt.	
			Organic N = Total N - (NO3+NH3)
Total Organic	0.0419	419	**Organic N = (%TKN-%NH4)**
TKN	0.042	420	**Inorganic N = (%NH4 + %NO3)**
NH3	0.0001	1	
NO3	0.018	180	
Phosphorus	0.092	920	
Potassium	0.056	560	

	mg/kg dry-wt.	lb. / yr.	lb./ac-yr.	kg/ha
Phosphorus	920	0	0.00000	0.00000
Potassium	560	0	0.00000	0.00000

pH	12

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NITROGEN	**mg/kg dry-wt.**	**lb. / yr.**	**lb./ac-yr.**	**kg/ha**	
Total Organic	419	86	86	96	
TKN	420	86	431	483	
NH3	1	0	1	1	
NO3	180	37	185	207	
lb. mineralized organic N/dry ton			30		
lb. inorganic N/dry ton			1236		
Total lb. available N/dry ton			1266.493		
NUTRIENT LOADING					
Crop nitrogen loading rate N lb./acre			100	112	**kg/ha**
Total acres land applied for year.			1		
Number dry tons land applied per acre			0	1	**metric ton/ha**
lb. Available Nitrogen per dry ton			0.00		
Total lb. Org-N produced per year			86		
Total lb. NH4 produced per year			0		
Total lb. NO3 produced per year			37	#DIV/0!	**lb. N / yd^3**
Total lb. Available N per year			123	#DIV/0!	**lb. N / gallon**
Min. number of acres required per year (Nitro			1		

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BIOSOLID METALS ANALYSIS AND CALCULATIONS
Sample calculation:
[([(5.0 mg As/1000000 mg TS X 140000 lb. Total Solids) = 0.07 lb. As/yr.
(((5.0 mg As/ 1000000 mg TS) x 140000 lb. TS) / 52 ac = 0.013 lb. As/ac-yr.
(EPA cumulative loading 41 total lb. As/ac / 0.013 lb. As/ac/yr.) = 2719.3 yr. site life for As
(0.013 lb. As/ac-yr.) x 1.12 conversion factor = 0.015 kg/ha-yr.
(2.6 tons biosolid is equivalent to a loading rate of 100 lb. total available N/ac) .

Metal Analysis	**mg/kg dry-wt.**
Arsenic	6.6
Cadmium	4.62
Chromium	0
Copper	337
Lead	71.2
Mercury	1.08
Molybdenum	9
Nickel	26.5
Selenium	8.7
Zinc	952

	0
Source	0
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Metals	Biosolid concentration mg/kg	Ceiling Limits 503.13 Table 1 Conc. mg/kg	Ceiling Limits 503.13 Table 1 metal lb./ton biosolid	Yearly lb. Metal per ton biosolids	Yearly Loading lb./ac-yr.	Yearly Loading kg/yr.
Arsenic	7	75	0.150	6.77160	6.77160	7.584
Cadmium	5	85	0.170	4.74012	4.74012	5.309
Chromium	0	1200	2.400	0.00000	0.00000	0.000
Copper	337	4300	8.600	345.76200	345.76200	387.253
Lead	71	840	1.680	73.05120	73.05120	81.817
Mercury	1	57	0.114	1.10808	1.10808	1.241
Molybdenum	9	75	0.150	9.23400	9.23400	10.342
Nickel	27	420	0.840	27.18900	27.18900	30.452
Selenium	9	100	0.200	8.92620	8.92620	9.997
Zinc	952	7500	15.000	976.75200	976.75200	1093.962

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

Metals	Analysis Biosolid conc. mg/kg	Cumulative Pollutant Limits CFR 503.13 Table 2 mg/ha	40 CFR 503.13 Table 2 metal lb./ac biosolid	Yearly lb. Metal per ton biosolids	Biosolid Loading lb./ac-yr.	Biosolid Loading kg/ha-yr.
Arsenic	6.6	41	45.920	0.924	0.9240	1.035
Cadmium	4.62	39	43.680	0.647	0.6468	0.724
Chromium	0	1200	1344.000	0.000	0.0000	0.000
Copper	337	1500	1680.000	47.180	47.1800	52.842
Lead	71.2	300	336.000	9.968	9.9680	11.164
Mercury	1.08	17	19.040	0.151	0.1512	0.169
Molybdenum	9	75	84.000	1.260	1.2600	1.411
Nickel	26.5	420	470.400	3.710	3.7100	4.155
Selenium	8.7	100	112.000	1.218	1.2180	1.364
Zinc	952	2800	3136.000	133.280	133.2800	149.274

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

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Metals	**Biosolid Analysis mg/kg**	**Pollutant Conc. Limits Table 3 mg/ha**	**Table 3 lb. Metal per /ac biosolid**	**Loading lb./ac-yr.**	**Loading kg/ha-yr.**	**Site Life in years**
Arsenic	6.6	41	45.920	0.003	0.004	10812
Cadmium	4.62	39	43.680	0.002	0.003	14692
Chromium	0	1200	1344.000	0.000	0.000	#DIV/0!
Copper	337	1500	1680.000	0.173	0.194	7747
Lead	71.2	300	336.000	0.037	0.041	7333
Mercury	1.08	17	19.040	0.001	0.001	27396
Molybdenum	9	75	84.000	0.005	0.005	14504
Nickel	26.5	420	470.400	0.014	0.015	27585
Selenium	8.7	100	112.000	0.004	0.005	20005
Zinc	952	2800	3136.000	0.488	0.547	5119

There are no limits for Chromium or Molybdenum under Table 3, Mo concentration comes from Table 1. Ceiling Limit.

40 CFR 503.13 Tables 1-4.

T1, Ceiling loading, bulk biosolids sold or given away, bag or container, can not exceed pollutant concentration Table 1.

T2, Cumulative Loading, has to meet Table 1 and 2 limits, no lawn/garden Class A no ability to tract.

T3, Pollutant Concentration , bulk biosolid land applied on agriculture land, forest,
public contact site or reclamation site has to meet Tables 1 &3.

T4, Annual Pollutant loading Rate, for land application of Class A biosolid
given away in bag or container, has to meet Table 1 & 4.