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ENVIRONMENTAL STANDARDS DIVISION

2019 BIOSOLIDS DEWATERING, MONITORING, DISPOSAL, AND MASTER PLAN UPDATE

ENVIRONMENT ACT LICENCE #1089E RR

January 2020

Water and Waste
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Manitoba Conservation and Climate
Environmental Compliance and Enforcement Branch
1007 Century Street
Winnipeg, MB R3H 04W

January 31, 2020

Attention: Ms. Shannon Kohler, Regional Director

RE: 2019 ANNUAL COMPLIANCE REPORT - ENVIRONMENT ACT LICENCE 1089E RR

Please find enclosed the City of Winnipeg's 2019 Biosolids Dewatering, Monitoring, Disposal and Master Plan Update Report in accordance with Environment Act Licence No. 1089E RR.

Included in this report are details of the:
a) 2019 biosolids distribution and monitoring programs
b) proposed 2020 biosolids distribution and monitoring programs
c) activities undertaken as part of the Biosolids Master Plan

Please let me know of any concerns or questions respecting this submission. I may be reached by telephone at 204-986-8359 or by e-mail at rgrosselle@winnipeg.ca.

Yours sincerely,

Original signed by:

R. Grosselle
Manager of Environmental Standards

Enclosures
cc: M.L. Geer, CPA, CA (email)
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2019 Biosolids Dewatering, Monitoring, Disposal,

and Master Plan Update

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January 2020

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1.0 INTRODUCTION

Environment Act Licence (EAL) #1089E RR, issued on June 14, 2000, requires that the City of Winnipeg monitor its biosolids dewatering and disposal operations and submit a report to the regulating authority and various municipalities on or before the 31st of January of each year.

Biosolids are an end product of sewage treatment; they are created when solids and sludge that are separated from wastewater are digested and dewatered. They are rich in nutrients and also contain metals and trace amounts of minerals.

Historically, the City of Winnipeg's biosolids were spread on agricultural fields to act as a fertilizer under a program known as WinGRO. In 2011, the allowable biosolids application rates were reduced. The existing WinGRO equipment could not operate at the reduced rates, and the program was discontinued as a result. From 2011 to 2014, all biosolids produced at the City of Winnipeg's North End Pollution Control Centre (NEWPCC) were disposed of at the Brady Road Resource Management Facility (BRRMF).

In 2014, the City of Winnipeg developed a Biosolids Master Plan[1] (BMP), a 30 year plan for maximizing the recovery and beneficial reuse of the nutrients contained in biosolids.

This report summarizes the results of the City's 2019 Biosolids Dewatering, Monitoring, and Disposal Program, and provides an update of activities taken in 2019 and activities planned for 2020 under the BMP.

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2.0 BIOSOLIDS COMPOSITION AND DISTRIBUTION

From January 1, 2019 to December 31, 2019 the City produced 54,202 wet tonnes of anaerobically digested, mechanically-dewatered biosolids at the NEWPCC; the total solids in the biosolids averaged 26.5 ± 2.7% (n = 261). The dewatering equipment achieved a total solids content of at least 20 percent by weight in the biosolids, except on October 29 and November 21 when process issues with the centrifuges allowed us to achieve a total solids content of 18.70% and 19.85% respectively.

Of the 54,202 wet tonnes of biosolids produced in 2019, approximately 1,916 wet tonnes were composted at the BRRMF, 18,015 wet tonnes were used in the Summit Landfill soil fabrication pilot project, 13,906 wet tonnes were applied to agricultural land, and 20,365 wet tonnes were disposed of at the BRRMF. The temporary storage facility in the RM of West St. Paul was not used to provide interim storage for mechanically-dewatered biosolids in 2019 and will not be used for biosolids storage in 2020.

The 2015-2019 Biosolids Distributions are shown in Chart 1, Table 1 contains analytical results for 2019 biosolids samples, and Appendix I contains the Monthly Hauling Summaries for 2019.

CHART 1: 2015-2019 BIOSOLIDS DISTRIBUTION

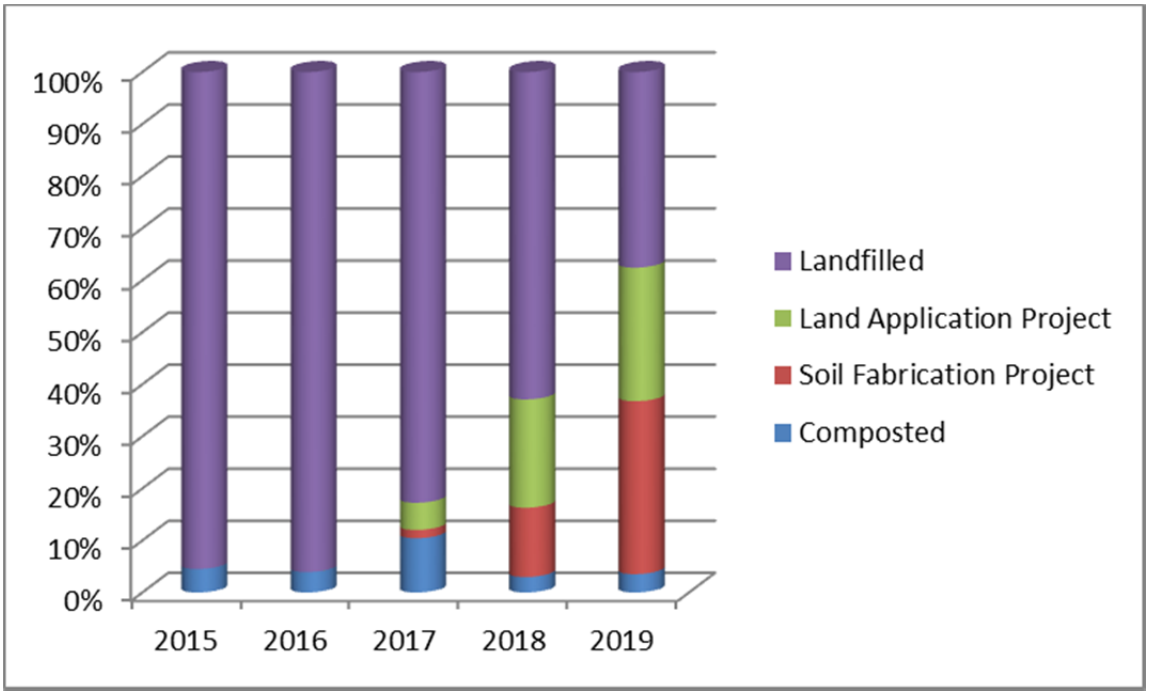

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TABLE 1

2019 Biosolids Quality

Sample Number	Date Sampled *	Total Cd (mg/Kg-Cd)	Total Cr (mg/Kg-Cr)	Total Cu (mg/Kg-Cu)	Total Ni (mg/Kg-Ni)	Total Pb (mg/Kg-Pb)	Total Zn (mg/Kg-Zn)	Total P (mg/Kg-P)	NH3-N (mg/Kg-N)	TKN (mg/Kg-N)	pH (units)	Specific Conductance (uS/cm)	Moisture (%)
1	24-Dec-18	6.4	63	472	32.3	42.2	3,384	15,430	6,437	45,900	5.93	12,200	61.0
2	7-Jan-19	4.3	232	691	34.5	43.1	3,309	21,530	10,420	44,000	6.05	13,200	75.8
3	21-Jan-19	2.6	369	635	29.8	35.3	1,819	23,850	8,133	41,100	5.88	11,800	70.5
4	4-Feb-19	2.3	223	668	31.4	35.7	1,261	26,840	8,961	43,300	5.74	10,300	75.1
5	19-Feb-19	1.7	148	662	29.1	32.9	978	26,910	4,874	39,700	5.73	10,800	60.9
6	4-Mar-19	1.4	101	569	24.7	34.9	785	23,800	9,437	35,800	5.79	8,120	71.1
7	18-Mar-19	1.4	89	475	28.4	43.0	721	21,530	7,702	29,300	5.94	7,860	67.9
8	1-Apr-19	1.3	86	506	32.3	48.6	745	19,230	7,769	27,500	5.98	8,400	69.1
9	15-Apr-19	1.2	75	458	29.0	44.5	1,569	17,930	7,912	26,200	6.03	9,470	70.0
10	29-Apr-19	1.2	70	456	26.7	34.9	1,037	16,770	7,926	30,700	6.07	9,620	70.3
11	13-May-19	1.5	115	520	27.9	36.0	1,070	18,430	10,370	34,700	5.87	8,530	70.5
12	27-May-19	1.5	101	519	26.3	37.3	1,052	17,410	9,741	36,000	5.84	9,140	73.5
13	10-Jun-19	1.5	95	553	28.9	36.4	926	18,040	9,516	38,000	5.84	9,680	74.0
14	24-Jun-19	10.7	134	841	45.3	49.6	1,227	21,870	9,344	40,100	5.90	9,890	73.8
15	8-Jul-19	5.0	93	559	33.6	44.9	819	19,560	10,150	30,900	5.95	9,700	73.3
16	22-Jul-19	3.4	97	603	35.9	31.5	1,030	19,770	9,080	37,500	5.78	9,590	73.4
17	6-Aug-19	2.3	79	533	31.4	27.9	1,015	17,830	9,299	30,900	5.95	9,540	75.3
18	19-Aug-19	2.4	136	640	34.1	29.1	1,516	20,000	9,296	38,800	5.86	10,000	74.4
19	3-Sep-19	2.0	130	710	38.6	37.8	1,436	23,260	9,419	37,900	5.83	11,100	75.6
20	16-Sep-19	1.7	114	653	37.1	41.2	1,209	20,470	9,384	37,200	5.85	9,510	74.9
21	30-Sep-19	2.0	122	755	46.8	53.3	1,957	24,220	8,093	35,600	5.79	9,190	73.0
22	15-Oct-19	1.4	102	651	39.0	45.1	1,914	21,890	8,335	36,800	5.92	9,910	73.5
23	28-Oct-19	1.0	119	640	38.2	41.8	1,720	26,120	9,992	33,800	6.09	12,900	73.5
24	12-Nov-19	1.2	150	609	41.1	30.8	1,215	23,320	10,250	36,900	6.13	13,600	77.2
25	25-Nov-19	1.3	110	587	57.2	23.7	1,026	19,150	9,025	43,300	6.13	11,200	75.8
26	9-Dec-19	2.4	104	650	44.3	44.2	1,142	23,880	8,048	39,900	6.09	11,200	76.2
	Average:	2.5	125	601	34.8	38.7	1,380	21,117	8,804	36,608	5.92	10,248	72.3
	Maximum:	10.7	369	841	57.2	53.3	3,384	26,910	10,420	45,900	6.13	13,600	77.2
	Minimum:	1.0	63	456	24.7	23.7	721	15,430	4,874	26,200	5.73	7,860	60.9

*** Indicates starting date for year 2019 biweekly composite samples**

3.0 BENEFICIAL REUSE OF BIOSOLIDS

(A) COMPOST

The City of Winnipeg conducted a pilot biosolids composting program from 2015 to 2018. A low odour, nutrient rich compost with low metals content was produced. A Notice of Alteration (NOA) to the BRRMF EAL 3081R allows for ongoing operational biosolids composting.

In 2019, 1,916 wet tonnes of biosolids were diverted to the compost facility. Bio-filters on the biosolids compost facility are used to control odours; none of the 38 odour complaints reported for the BRRMF in 2019 were attributed specifically to biosolids.

In 2020, biosolids composting will continue on an as-needed basis to meet final cover needs at the BRRMF.

The City of Winnipeg Biosolids Compost Pilot Report[2] provides a detailed description of the project.

(B) SOIL FABRICATION

The City of Winnipeg is conducting a three year (2018-2020) soil fabrication pilot project at the Summit Landfill.

In 2019, approximately 18,015 wet tonnes of biosolids were mixed with approximately 36,000 m^3 of wood chips and 54,000 m^3 of street sweepings to produce an estimated volume of 108,000 m^3 of fabricated soil. Approximately half of the fabricated soil was spread over 5 hectares in the fall of 2019; the other half was windrowed and will be spread over 5 hectares in the spring of 2020.

Although odours were noted locally during receiving operations, they were reduced after mixing the biosolids with woodchips and street sweepings. No odours were detected offsite during the biosolids receiving or soil spreading operations and no odour complaints were received through 311 or other public sources.

Run off from the plot of soil that was fabricated and spread in 2018 (Y1P1) was sampled after the spring thaw, and results were compared to CCME surface water guidelines. The results indicate that soil fabrication had no influence on surface water runoff. Due to the porosity and water retention capabilities of the material, there has been limited runoff from the site. Additionally, all runoff is contained and treated on site, using a linear surface water ditch and natural vegetation.

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Samples of the Y1P1 soil were taken prior to seeding the plot with oats in the spring of 2019. The results show that the material meets Canadian Council of Ministers of the Environment (CCME) Recommended Canadian Soil Quality Guidelines for both Industrial and Agricultural uses. Vegetation density analysis showed that the seeded plot had approximately 92% vegetation density and visual observation taken in the field over the summer months noted minimal weed growth.

Approximately 25,000 wet tonnes of biosolids are expected to be used for soil fabrication in 2020. The three year pilot project will end on December 31, 2020.

A detailed description of the 2019 project and findings are found in the Summit Landfill Soil Fabrication Pilot Project Year Two Annual Report[3], which will be submitted to Manitoba Conservation and Climate (MCC) in March/April 2020; the final report will be submitted by June 30, 2021.

(c) BIOSOLIDS STORAGE AND LAND APPLICATION

The City is conducting a three-year (2018-2020) full scale Biosolds Land Application program in the RM of Rosser.

Between June and September 2019, approximately 13,906 wet tonnes of biosolids were either stored at two in-field storage sites and subsequently applied or applied directly (without being stored) to three plots of agricultural land (W1/2-31-12-01WPM (Field 1), S1/2-28-12-01-WPM (Field 2), and W1/2-29-12-01WPM (Field 3)). Soils samples were collected post-harvest from Fields 1-3 to aid in the determination of the biosolids prescription rates of 12 dry tonnes per hectare on Field 1 and 11 dry tonnes per hectare on Fields 2 and 3.

Biosolids stockpiles were placed on top of a layer of straw to minimize leaching and they were bermed by straw bales and covered with a layer of straw to minimize odours. Odour assessments ranked the biosolids odours as annoying to very annoying at points closest to the stockpiles but ranked them between annoying and no odour at points further from the stockpiles. The RM of Rosser Reeve and Council did not receive any complaints about odours during the 2019 program and the City did not receive any odour concerns from the public through the project phone number or email address.

The City is required to monitor nutrient concentrations in soil for three years after applying biosolids. In 2019 samples were collected from the fields that received biosolids under the 2017 pilot program (31-8-01EPM) and under the full scale program in 2018 (36-12-2W). The results for

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both fields were consistent with anticipated post crop harvest soil residual results for nitrogen and phosphorus within heavy clay soils.

An NOA to EAL 1089E RR for completion of the land application project will be submitted to Manitoba Conservation and Climate in 2020 if a new EAL has not been granted. The 2020 Land Application program will include sourcing cooperating farm producers and suitable land, and determining storage area locations and configurations once the agricultural land has been selected. Storage area(s) set up and biosolids hauling will commence after road restrictions have been lifted.

A detailed description of the project, including analytical results, is found in The City of Winnipeg Biosolids Land Application Program Summary Report[4], which will be submitted to MCC in March/April 2020.

(D) LANDFILL DISPOSAL

Of the 54,202 wet tonnes biosolids produced in 2019, approximately 20,365 wet tonnes were disposed at the BRRMF, which is not considered a beneficial reuse of nutrients.

We continue to monitor odours at the BRRMF on a weekly basis and follow up with any odour complaints. Odour mitigation strategies for biosolids have largely been successful as none of the 38 odour complaints reported in 2019 were attributed specifically to biosolids. The City continues to use strategies to help mitigate odours including:

- Covering biosolids quickly with soil or other wastes that do not cause odours
- Scheduling the arrival of biosolids at specific times of day when wind conditions are not likely to cause concern for odour
- Collecting and burning landfill gas to help mitigate buried biosolid odours
- Controlling storm water runoff to prevent leachate generation and ponding of water that causes odour
- Using compost near odour point sources to help control odour
- Using woodchips in the biosolids trench to help mitigate odour when spreading biosolids

In 2020, biosolids that are not composted, land applied, or used in the soil fabrication project will be disposed of at the BRRMF.

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4.0 ADDITIONAL ACTIVITIES UNDER THE BIOSOLIDS MASTER PLAN

An application has been submitted for Provincial and Federal funding for a new digestion facility with thermal hydrolysis pre-treatment at the NEWPCC, which has been ranked as the City's #1 infrastructure project. Updates pertaining to design and construction of the new digestion facility will be reported to MCC in the bi-annual NEWPCC Master Plan Reports.

5.0 REFERENCES

1. COW/Veolia. September 2014. City of Winnipeg Biosolids Master Plan

2. COW. October 2018. City of Winnipeg Biosolids Compost Pilot Report

3. COW. January 2020 (Draft) Summit Landfill Soil Fabrication Pilot Project Year Two Annual Report

4. WSP. January 2020. (Draft) City of Winnipeg Biosolids Land Application Program Summary Report

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APPENDIX I
MONTHLY HAULING SUMMARIES

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2019 Biosolids Management Program

January

Date	Wet Cake	% Total Solids	Dry Cake	Loads to Landfill	Loads for Soil Fab	Loads to Land App	Loads to Compost	Loads Total	Wet Cake Landfill	Wet Cake Soil Fab	Wet Cake Land App	Wet Cake Compost
1												
2	248.16	23.15	57.45	10	0	0	0	10	248.16	0.00	0.00	0.00
3	247.88	21.90	54.29	10	0	0	0	10	247.88	0.00	0.00	0.00
4	293.86	20.90	61.42	12	0	0	0	12	293.86	0.00	0.00	0.00
5												
6												
7	198.54	23.60	46.86	8	0	0	0	8	198.54	0.00	0.00	0.00
8	202.17	23.20	46.90	8	0	0	0	8	202.17	0.00	0.00	0.00
9	122.16	25.05	30.60	5	0	0	0	5	122.16	0.00	0.00	0.00
10	152.79	24.15	36.90	6	0	0	0	6	152.79	0.00	0.00	0.00
11	152.53	24.45	37.29	6	0	0	0	6	152.53	0.00	0.00	0.00
12												
13												
14	254.53	24.00	61.09	10	0	0	0	10	254.53	0.00	0.00	0.00
15	254.54	23.07	58.72	10	0	0	0	10	254.54	0.00	0.00	0.00
16	200.19	23.37	46.78	8	0	0	0	8	200.19	0.00	0.00	0.00
17	198.53	23.51	46.67	8	0	0	0	8	198.53	0.00	0.00	0.00
18	103.94	24.43	25.39	4	0	0	0	4	103.94	0.00	0.00	0.00
19												
20												
21	259.40	24.18	62.72	10	0	0	0	10	259.40	0.00	0.00	0.00
22	207.55	23.93	49.67	8	0	0	0	8	207.55	0.00	0.00	0.00
23	257.43	24.00	61.78	10	0	0	0	10	257.43	0.00	0.00	0.00
24	150.03	23.50	35.26	6	0	0	0	6	150.03	0.00	0.00	0.00
25	156.23	24.90	38.90	6	0	0	0	6	156.23	0.00	0.00	0.00
26												
27												
28	206.79	23.76	49.13	8	0	0	0	8	206.79	0.00	0.00	0.00
29	51.81	26.00	13.47	2	0	0	0	2	51.81	0.00	0.00	0.00
30	101.62	25.44	25.85	4	0	0	0	4	101.62	0.00	0.00	0.00
31	154.83	25.44	39.39	6	0	0	0	6	154.83	0.00	0.00	0.00
TOTAL	4175.51	23.91	986.54	165	0	0	0	165	4175.51	0.00	0.00	0.00

NOTES:

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2019 Biosolids Management Program

February

Date	Wet Cake	% Total Solids	Dry Cake	Loads to Landfill	Loads for Soil Fab	Loads to Land App	Loads to Compost	Loads Total	Wet Cake Landfill	Wet Cake Soil Fab	Wet Cake Land App	Wet Cake Compost
1	257.52	25.06	64.53	10	0	0	0	10	257.52	0.00	0.00	0.00
2	154.84	25.36	39.27	6	0	0	0	6	154.84	0.00	0.00	0.00
3	51.85	25.36	13.15	2	0	0	0	2	51.85	0.00	0.00	0.00
4	200.35	25.65	51.39	0	8	0	0	8	0.00	200.35	0.00	0.00
5	249.67	24.80	61.92	0	10	0	0	10	0.00	249.67	0.00	0.00
6	249.76	24.48	61.14	0	10	0	0	10	0.00	249.76	0.00	0.00
7	173.69	25.19	43.75	0	7	0	0	7	0.00	173.69	0.00	0.00
8	88.75	25.02	22.21	0	4	0	0	4	0.00	88.75	0.00	0.00
9												
10												
11	150.70	25.02	37.71	6	0	0	0	6	150.70	0.00	0.00	0.00
12	250.31	24.84	62.18	0	10	0	0	10	0.00	250.31	0.00	0.00
13	250.34	24.51	61.36	0	10	0	0	10	0.00	250.34	0.00	0.00
14	249.63	24.63	61.48	0	10	0	0	10	0.00	249.63	0.00	0.00
15	149.60	25.40	38.00	0	6	0	0	6	0.00	149.60	0.00	0.00
16												
17												
18												
19	249.93	26.17	65.41	0	10	0	0	10	0.00	249.93	0.00	0.00
20	299.29	25.80	77.22	0	12	0	0	12	0.00	299.29	0.00	0.00
21	149.56	25.42	38.02	0	6	0	0	6	0.00	149.56	0.00	0.00
22	196.36	27.11	53.23	0	8	0	0	8	0.00	196.36	0.00	0.00
23												
24												
25	225.57	26.50	59.78	0	9	0	0	9	0.00	225.57	0.00	0.00
26	199.60	26.68	53.25	0	8	0	0	8	0.00	199.60	0.00	0.00
27	191.89	27.95	53.63	0	8	0	0	8	0.00	191.89	0.00	0.00
28	137.57	26.83	36.91	0	6	0	0	6	0.00	137.57	0.00	0.00
TOTAL	4126.78	25.61	1055.53	24	142	0	0	166	614.91	3511.87	0.00	0.00

NOTES:

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2019 Biosolids Management Program

March

Date	Wet Cake	% Total Solids	Dry Cake	Loads to Landfill	Loads for Soil Fab	Loads to Land App	Loads to Compost	Loads Total	Wet Cake Landfill	Wet Cake Soil Fab	Wet Cake Land App	Wet Cake Compost
1	99.77	26.17	26.11	0	4	0	0	4	0.00	99.77	0.00	0.00
2												
3												
4	199.86	28.16	56.28	0	8	0	0	8	0.00	199.86	0.00	0.00
5	175.93	27.42	48.24	0	7	0	0	7	0.00	175.93	0.00	0.00
6	199.91	26.68	53.34	0	8	0	0	8	0.00	199.91	0.00	0.00
7	250.04	28.32	70.81	0	10	0	0	10	0.00	250.04	0.00	0.00
8	200.23	27.59	55.24	0	8	0	0	8	0.00	200.23	0.00	0.00
9												
10												
11	250.48	28.85	72.26	0	10	0	0	10	0.00	250.48	0.00	0.00
12	250.02	30.11	75.28	0	10	0	0	10	0.00	250.02	0.00	0.00
13	224.79	29.75	66.88	0	9	0	0	9	0.00	224.79	0.00	0.00
14	249.92	30.23	75.55	0	10	0	0	10	0.00	249.92	0.00	0.00
15	201.60	31.15	62.80	0	8	0	0	8	0.00	201.60	0.00	0.00
16												
17												
18	250.38	31.52	78.92	0	10	0	0	10	0.00	250.38	0.00	0.00
19	250.67	29.38	73.65	0	10	0	0	10	0.00	250.67	0.00	0.00
20	300.82	30.92	93.01	0	12	0	0	12	0.00	300.82	0.00	0.00
21	300.40	32.46	97.51	0	12	0	0	12	0.00	300.40	0.00	0.00
22	250.31	31.93	79.92	0	10	0	0	10	0.00	250.31	0.00	0.00
23												
24												
25	275.43	31.39	86.46	0	11	0	0	11	0.00	275.43	0.00	0.00
26	350.01	32.16	112.56	0	14	0	0	14	0.00	350.01	0.00	0.00
27	250.05	32.64	81.62	0	10	0	0	10	0.00	250.05	0.00	0.00
28	173.43	33.87	58.74	0	7	0	0	7	0.00	173.43	0.00	0.00
29	173.23	33.13	57.39	0	7	0	0	7	0.00	173.23	0.00	0.00
30												
31												
TOTAL	4877.28	30.18	1482.57	0	195	0	0	195	0.00	4877.28	0.00	0.00

NOTES:

Winnipeg | Water and Waste / Eaux et déchets

2019 Biosolids Management Program

April

Date	Wet Cake	% Total Solids	Dry Cake	Loads to Landfill	Loads for Soil Fab	Loads to Land App	Loads to Compost	Loads Total	Wet Cake Landfill	Wet Cake Soil Fab	Wet Cake Land App	Wet Cake Compost
1	250.08	30.41	76.05	5	0	0	5	10	124.79	0.00	0.00	125.29
2	250.05	31.26	78.17	5	0	0	5	10	124.84	0.00	0.00	125.21
3	174.92	30.31	53.02	7	0	0	0	7	174.92	0.00	0.00	0.00
4	249.89	31.95	79.84	10	0	0	0	10	249.89	0.00	0.00	0.00
5	249.54	31.74	79.20	10	0	0	0	10	249.54	0.00	0.00	0.00
6												
7												
8	250.63	31.96	80.10	7	0	0	4	11	150.51	0.00	0.00	100.12
9	298.96	33.39	99.82	7	0	0	5	12	174.22	0.00	0.00	124.74
10	224.20	31.15	69.84	9	0	0	0	9	224.20	0.00	0.00	0.00
11	246.11	30.87	75.97	10	0	0	0	10	246.11	0.00	0.00	0.00
12	147.41	29.90	44.08	6	0	0	0	6	147.41	0.00	0.00	0.00
13												
14												
15	250.44	31.01	77.66	4	0	0	6	10	100.56	0.00	0.00	149.88
16	245.33	30.61	75.10	6	0	0	4	10	146.27	0.00	0.00	99.06
17	248.30	31.65	78.59	10	0	0	0	10	248.30	0.00	0.00	0.00
18	297.92	32.77	97.63	12	0	0	0	12	297.92	0.00	0.00	0.00
19	199.27	30.65	61.08	8	0	0	0	8	199.27	0.00	0.00	0.00
20												
21												
22	198.37	30.65	60.80	8	0	0	0	8	198.37	0.00	0.00	0.00
23	198.06	28.53	56.51	8	0	0	0	8	198.06	0.00	0.00	0.00
24	197.47	30.13	59.50	8	0	0	0	8	197.47	0.00	0.00	0.00
25	196.90	27.03	53.22	8	0	0	0	8	196.90	0.00	0.00	0.00
26	149.59	28.53	42.68	6	0	0	0	6	149.59	0.00	0.00	0.00
27	49.07	28.91	14.19	2	0	0	0	2	49.07	0.00	0.00	0.00
28												
29	248.41	29.29	72.76	10	0	0	0	10	248.41	0.00	0.00	0.00
30	296.65	29.28	86.86	12	0	0	0	12	296.65	0.00	0.00	0.00
TOTAL	5117.57	30.52	1572.65	178	0	0	29	207	4393.27	0.00	0.00	724.30

NOTES:

Water and Waste
Eaux et déchets

2019 Biosolids Management Program

May

Date	Wet Cake	% Total Solids	Dry Cake	Loads to Landfill	Loads for Soil Fab	Loads to Land App	Loads to Compost	Loads Total	Wet Cake Landfill	Wet Cake Soil Fab	Wet Cake Land App	Wet Cake Compost
1	198.07	27.87	55.20	8	0	0	0	8	198.07	0.00	0.00	0.00
2	173.35	30.28	52.49	7	0	0	0	7	173.35	0.00	0.00	0.00
3	194.44	29.69	57.73	8	0	0	0	8	194.44	0.00	0.00	0.00
4												
5												
6	246.27	29.58	72.85	6	0	0	4	10	149.83	0.00	0.00	96.44
7	249.74	29.47	73.60	6	0	0	4	10	149.73	0.00	0.00	100.01
8	249.33	29.58	73.75	10	0	0	0	10	249.33	0.00	0.00	0.00
9	251.33	30.27	76.08	10	0	0	0	10	251.33	0.00	0.00	0.00
10	147.04	28.33	41.66	6	0	0	0	6	147.04	0.00	0.00	0.00
11												
12												
13	250.50	29.63	74.22	5	0	0	5	10	125.78	0.00	0.00	124.72
14	249.46	27.20	67.85	5	0	0	5	10	124.75	0.00	0.00	124.71
15	249.47	27.92	69.65	10	0	0	0	10	249.47	0.00	0.00	0.00
16	199.48	26.66	53.18	8	0	0	0	8	199.48	0.00	0.00	0.00
17	150.18	30.60	45.96	6	0	0	0	6	150.18	0.00	0.00	0.00
18												
19												
20	199.78	31.15	62.23	8	0	0	0	8	199.78	0.00	0.00	0.00
21	249.36	31.70	79.05	5	0	0	5	10	124.67	0.00	0.00	124.69
22	246.36	29.94	73.76	10	0	0	0	10	246.36	0.00	0.00	0.00
23	193.72	29.31	56.78	8	0	0	0	8	193.72	0.00	0.00	0.00
24	145.37	30.46	44.28	6	0	0	0	6	145.37	0.00	0.00	0.00
25												
26												
27	345.16	28.88	99.68	5	0	0	9	14	124.76	0.00	0.00	220.40
28	196.43	28.84	56.65	7	0	0	1	8	172.31	0.00	0.00	24.12
29	243.44	21.32	51.90	10	0	0	0	10	243.44	0.00	0.00	0.00
30	244.88	28.31	69.33	10	0	0	0	10	244.88	0.00	0.00	0.00
31	318.86	26.22	83.61	12	0	0	0	12	318.86	0.00	0.00	0.00
TOTAL	5192.02	28.84	1491.48	176	0	0	33	209	4376.93	0.00	0.00	815.09

NOTES:

Winnipeg | Water and Waste / Eaux et déchets

2019 Biosolids Management Program

June

Date	Wet Cake	% Total Solids	Dry Cake	Loads to Landfill	Loads for Soil Fab	Loads to Land App	Loads to Compost	Loads Total	Wet Cake Landfill	Wet Cake Soil Fab	Wet Cake Land App	Wet Cake Compost
1												
2												
3	340.42	27.50	93.62	5	0	0	9	14	124.88	0.00	0.00	215.54
4	245.11	25.50	62.50	9	0	0	1	10	220.98	0.00	0.00	24.13
5	245.48	28.10	68.98	10	0	0	0	10	245.48	0.00	0.00	0.00
6	220.41	27.20	59.95	9	0	0	0	9	220.41	0.00	0.00	0.00
7	219.27	26.30	57.67	9	0	0	0	9	219.27	0.00	0.00	0.00
8												
9												
10	242.74	25.40	61.66	4	0	0	6	10	96.54	0.00	0.00	146.20
11	242.66	25.50	61.88	10	0	0	0	10	242.66	0.00	0.00	0.00
12	265.38	25.20	66.88	11	0	0	0	11	265.38	0.00	0.00	0.00
13	240.10	26.65	63.99	10	0	0	0	10	240.10	0.00	0.00	0.00
14	217.40	26.80	58.26	9	0	0	0	9	217.40	0.00	0.00	0.00
15												
16												
17	240.37	24.30	58.41	0	0	10	0	10	0.00	0.00	240.37	0.00
18	339.38	23.60	80.09	0	0	14	0	14	0.00	0.00	339.38	0.00
19	172.45	27.00	46.56	0	0	9	0	9	0.00	0.00	172.45	0.00
20	71.39	27.50	19.63	0	0	3	0	3	0.00	0.00	71.39	0.00
21	138.73	27.60	38.29	0	0	6	0	6	0.00	0.00	138.73	0.00
22												
23												
24	198.74	27.45	54.55	0	0	8	0	8	0.00	0.00	198.74	0.00
25	199.65	26.45	52.81	0	0	8	0	8	0.00	0.00	199.65	0.00
26	100.02	26.80	26.81	0	0	4	0	4	0.00	0.00	100.02	0.00
27	249.83	28.10	70.20	0	0	10	0	10	0.00	0.00	249.83	0.00
28	93.47	27.70	25.89	0	0	4	0	4	0.00	0.00	93.47	0.00
29												
30												
TOTAL	4283.00	26.53	1128.62	86	0	76	16	178	2093.10	0.00	1804.03	385.87

NOTES:

Water and Waste
Eaux et déchets

2019 Biosolids Management Program

July

Date	Wet Cake	% Total Solids	Dry Cake	Loads to Landfill	Loads for Soil Fab	Loads to Land App	Loads to Compost	Loads Total	Wet Cake Landfill	Wet Cake Soil Fab	Wet Cake Land App	Wet Cake Compost
1	100.55	26.48	26.63	0	0	4	0	4	0.00	0.00	100.55	0.00
2	251.23	23.10	58.03	0	0	10	0	10	0.00	0.00	251.23	0.00
3	275.15	26.90	74.02	0	0	11	0	11	0.00	0.00	275.15	0.00
4	219.93	26.05	57.29	0	0	9	0	9	0.00	0.00	219.93	0.00
5	74.70	25.25	18.86	0	0	3	0	3	0.00	0.00	74.70	0.00
6												
7												
8	349.93	24.80	86.78	0	0	14	0	14	0.00	0.00	349.93	0.00
9	248.49	25.10	62.37	0	0	10	0	10	0.00	0.00	248.49	0.00
10	126.02	25.35	31.95	0	0	5	0	5	0.00	0.00	126.02	0.00
11	198.53	26.30	52.21	0	0	8	0	8	0.00	0.00	198.53	0.00
12	151.25	26.60	40.23	0	0	6	0	6	0.00	0.00	151.25	0.00
13												
14												
15	350.76	26.48	92.88	0	0	14	0	14	0.00	0.00	350.76	0.00
16	272.53	28.45	77.53	0	0	11	0	11	0.00	0.00	272.53	0.00
17	213.49	28.80	61.49	9	0	0	0	9	213.49	0.00	0.00	0.00
18	300.84	26.48	79.66	0	0	12	0	12	0.00	0.00	300.84	0.00
19	199.78	28.70	57.34	0	0	8	0	8	0.00	0.00	199.78	0.00
20												
21												
22	350.10	26.45	92.60	0	0	14	0	14	0.00	0.00	350.10	0.00
23	274.48	26.48	72.68	0	0	11	0	11	0.00	0.00	274.48	0.00
24	214.76	27.20	58.41	0	0	9	0	9	0.00	0.00	214.76	0.00
25	226.04	25.95	58.66	0	0	9	0	9	0.00	0.00	226.04	0.00
26	100.19	27.75	27.80	0	0	4	0	4	0.00	0.00	100.19	0.00
27												
28												
29	200.62	28.00	56.17	0	0	8	0	8	0.00	0.00	200.62	0.00
30	224.66	26.55	59.65	0	0	9	0	9	0.00	0.00	224.66	0.00
31	225.00	25.80	58.05	0	0	9	0	9	0.00	0.00	225.00	0.00
TOTAL	5149.03	26.48	1361.30	9	0	198	0	207	213.49	0.00	4935.54	0.00

NOTES:

Water and Waste
Eaux et déchets

2019 Biosolids Management Program

August

Date	Wet Cake	% Total Solids	Dry Cake	Loads to Landfill	Loads for Soil Fab	Loads to Land App	Loads to Compost	Loads Total	Wet Cake Landfill	Wet Cake Soil Fab	Wet Cake Land App	Wet Cake Compost
1	224.81	25.80	58.00	0	0	9	0	9	0.00	0.00	224.81	0.00
2	147.01	25.80	37.93	0	0	6	0	6	0.00	0.00	147.01	0.00
3												
4												
5												
6	250.64	25.41	63.69	0	0	10	0	10	0.00	0.00	250.64	0.00
7	250.12	25.41	63.56	0	0	10	0	10	0.00	0.00	250.12	0.00
8	124.83	24.55	30.65	0	0	5	0	5	0.00	0.00	124.83	0.00
9	124.81	25.30	31.58	0	0	5	0	5	0.00	0.00	124.81	0.00
10												
11												
12	225.67	23.60	53.26	0	0	9	0	9	0.00	0.00	225.67	0.00
13	115.98	23.05	26.73	0	0	5	0	5	0.00	0.00	115.98	0.00
14	168.79	25.80	43.55	0	0	7	0	7	0.00	0.00	168.79	0.00
15	149.56	26.50	39.63	0	0	6	0	6	0.00	0.00	149.56	0.00
16	170.18	25.35	43.14	0	0	7	0	7	0.00	0.00	170.18	0.00
17												
18												
19	280.15	24.45	68.50	0	0	12	0	12	0.00	0.00	280.15	0.00
20	160.28	25.70	41.19	0	0	7	0	7	0.00	0.00	160.28	0.00
21	185.59	25.75	47.79	0	0	8	0	8	0.00	0.00	185.59	0.00
22	168.55	26.55	44.75	0	0	7	0	7	0.00	0.00	168.55	0.00
23	110.03	25.90	28.50	0	0	5	0	5	0.00	0.00	110.03	0.00
24												
25												
26	312.19	24.10	75.24	0	0	13	0	13	0.00	0.00	312.19	0.00
27	332.12	25.50	84.69	0	0	14	0	14	0.00	0.00	332.12	0.00
28	172.22	27.25	46.93	0	0	7	0	7	0.00	0.00	172.22	0.00
29	241.35	26.45	63.84	0	0	10	0	10	0.00	0.00	241.35	0.00
30	258.32	26.50	68.45	0	0	11	0	11	0.00	0.00	258.32	0.00
31												
TOTAL	4173.20	25.46	1061.58	0	0	173	0	173	0.00	0.00	4173.20	0.00

NOTES:

Winnipeg | Water and Waste / Eaux et déchets

2019 Biosolids Management Program

September

Date	Wet Cake	% Total Solids	Dry Cake	Loads to Landfill	Loads for Soil Fab	Loads to Land App	Loads to Compost	Loads Total	Wet Cake Landfill	Wet Cake Soil Fab	Wet Cake Land App	Wet Cake Compost
1												
2												
3	230.09	26.30	60.51	0	0	10	0	0	0.00	0.00	230.09	0.00
4	183.66	25.40	46.65	0	0	8	0	8	0.00	0.00	183.66	0.00
5	252.35	22.55	56.90	0	0	11	0	11	0.00	0.00	252.35	0.00
6	321.03	26.30	84.43	0	0	14	0	14	0.00	0.00	321.03	0.00
7	22.93	24.95	5.72	0	0	1	0	1	0.00	0.00	22.93	0.00
8												
9	275.21	23.60	64.95	0	0	12	0	12	0.00	0.00	275.21	0.00
10	229.51	24.50	56.23	0	0	10	0	10	0.00	0.00	229.51	0.00
11												
12	242.92	24.90	60.49	0	10	0	0	10	0.00	242.92	0.00	0.00
13	146.14	25.75	37.63	0	6	0	0	6	0.00	146.14	0.00	0.00
14	193.98	25.33	49.14	0	8	0	0	8	0.00	193.98	0.00	0.00
15	123.48	24.63	30.41	0	5	0	0	5	0.00	123.48	0.00	0.00
16	335.37	24.15	80.99	0	0	14	0	14	0.00	0.00	335.37	0.00
17	264.06	24.60	64.96	0	0	11	0	11	0.00	0.00	264.06	0.00
18	46.27	22.90	10.60	0	0	2	0	2	0.00	0.00	46.27	0.00
19	228.12	25.35	57.83	0	0	10	0	10	0.00	0.00	228.12	0.00
20	64.95	26.15	16.98	0	0	3	0	3	0.00	0.00	64.95	0.00
21												
22	82.89	26.24	21.75	0	0	4	0	4	0.00	0.00	82.89	0.00
23	153.45	27.80	42.66	0	0	7	0	7	0.00	0.00	153.45	0.00
24	174.10	26.10	45.44	0	0	8	0	8	0.00	0.00	174.10	0.00
25	129.72	26.25	34.05	0	0	6	0	6	0.00	0.00	129.72	0.00
26	138.53	26.40	36.57	0	6	0	0	6	0.00	138.53	0.00	0.00
27	170.00	24.65	41.91	0	7	0	0	7	0.00	170.00	0.00	0.00
28												
29												
30	160.90	26.00	41.83	0	7	0	0	7	0.00	160.90	0.00	0.00
TOTAL	4169.66	25.25	1048.64	0	49	131	0	180	0.00	1175.95	2993.71	0.00

NOTES:

Water and Waste
Eaux et déchets

2019 Biosolids Management Program

October

Date	Wet Cake	% Total Solids	Dry Cake	Loads to Landfill	Loads for Soil Fab	Loads to Land App	Loads to Compost	Loads Total	Wet Cake Landfill	Wet Cake Soil Fab	Wet Cake Land App	Wet Cake Compost
1	155.06	24.00	37.21	0	7	0	0	7	0.00	155.06	0.00	0
2	162.20	34.10	55.31	0	7	0	0	7	0.00	162.20	0.00	0.00
3	71.68	30.65	21.97	0	3	0	0	3	0.00	71.68	0.00	0.00
4	143.40	25.10	35.99	0	6	0	0	6	0.00	143.40	0.00	0.00
5												
6												
7	210.50	27.30	57.47	0	9	0	0	9	0.00	210.50	0.00	0.00
8	185.92	25.35	47.13	0	8	0	0	8	0.00	185.92	0.00	0.00
9	207.77	27.30	56.72	0	9	0	0	9	0.00	207.77	0.00	0.00
10	195.66	26.40	51.65	0	9	0	0	9	0.00	195.66	0.00	0.00
11	215.48	29.00	62.49	0	9	0	0	9	0.00	215.48	0.00	0.00
12												
13												
14												
15	198.28	25.20	49.97	0	8	0	0	8	0.00	198.28	0.00	0.00
16	216.52	26.00	56.30	0	9	0	0	9	0.00	216.52	0.00	0.00
17	164.46	26.25	43.17	0	7	0	0	7	0.00	164.46	0.00	0.00
18	94.41	27.55	26.01	0	4	0	0	4	0.00	94.41	0.00	0.00
19												
20												
21	219.68	24.85	54.59	0	9	0	0	9	0.00	219.68	0.00	0.00
22	215.38	28.00	60.31	0	9	0	0	9	0.00	215.38	0.00	0.00
23	192.25	26.15	50.27	0	8	0	0	8	0.00	192.25	0.00	0.00
24	167.22	30.30	50.67	0	7	0	0	7	0.00	167.22	0.00	0.00
25	147.61	23.85	35.20	0	6	0	0	6	0.00	147.61	0.00	0.00
26												
27												
28	315.30	26.70	84.19	0	13	0	0	13	0.00	315.30	0.00	0.00
29	217.46	18.70	40.67	0	9	0	0	9	0.00	217.46	0.00	0.00
30	239.48	23.90	57.24	0	10	0	0	10	0.00	239.48	0.00	0.00
31	240.54	24.65	59.29	0	10	0	0	10	0.00	240.54	0.00	0.00
TOTAL	4176.26	26.42	1093.81	0	176	0	0	176	0.00	4176.26	0.00	0.00

NOTES:

Water and Waste
Eaux et déchets

2019 Biosolids Management Program

November

Date	Wet Cake	% Total Solids	Dry Cake	Loads to Landfill	Loads for Soil Fab	Loads to Land App	Loads to Compost	Loads Total	Wet Cake Landfill	Wet Cake Soil Fab	Wet Cake Land App	Wet Cake Compost
1	142.70	28.00	39.96	0	6	0	0	6	0.00	142.70	0.00	0.00
2												
3												
4	241.57	26.30	63.53	0	10	0	0	10	0.00	241.57	0.00	0.00
5	240.08	24.85	59.66	0	10	0	0	10	0.00	240.08	0.00	0.00
6	236.38	25.30	59.80	0	10	0	0	10	0.00	236.38	0.00	0.00
7	243.80	24.47	59.66	0	10	0	0	10	0.00	243.80	0.00	0.00
8	179.25	24.85	44.54	0	7	0	0	7	0.00	179.25	0.00	0.00
9												
10												
11	174.94	24.24	42.41	0	7	0	0	7	0.00	174.94	0.00	0.00
12	264.87	23.73	62.85	0	11	0	0	11	0.00	264.87	0.00	0.00
13	242.00	24.30	58.81	0	10	0	0	10	0.00	242.00	0.00	0.00
14	238.76	24.47	58.42	0	10	0	0	10	0.00	238.76	0.00	0.00
15	95.77	24.47	23.43	0	4	0	0	4	0.00	95.77	0.00	0.00
16												
17												
18	192.15	24.47	47.02	0	8	0	0	8	0.00	192.15	0.00	0.00
19	191.48	21.80	41.74	0	8	0	0	8	0.00	191.48	0.00	0.00
20	96.91	25.40	24.62	0	4	0	0	4	0.00	96.91	0.00	0.00
21	288.10	19.85	57.19	0	12	0	0	12	0.00	288.10	0.00	0.00
22	194.34	24.50	47.61	0	8	0	0	8	0.00	194.34	0.00	0.00
23												
24												
25	193.44	24.47	47.33	0	8	0	0	8	0.00	193.44	0.00	0.00
26	192.37	23.90	45.98	0	8	0	0	8	0.00	192.37	0.00	0.00
27	216.08	26.30	56.83	0	9	0	0	9	0.00	216.08	0.00	0.00
28	215.92	23.45	50.63	0	9	0	0	9	0.00	215.92	0.00	0.00
29	192.77	24.53	47.29	0	8	0	0	8	0.00	192.77	0.00	0.00
30												
TOTAL	4273.68	24.46	1039.32	0	177	0	0	177	0.00	4273.68	0.00	0.00

NOTES:

Water and Waste
Eaux et déchets

2019 Biosolids Management Program

December

Date	Wet Cake	% Total Solids	Dry Cake	Loads to Landfill	Loads for Soil Fab	Loads to Land App	Loads to Compost	Loads Total	Wet Cake Landfill	Wet Cake Soil Fab	Wet Cake Land App	Wet Cake Compost
1												
2	240.59	22.80	54.85	10	0	0	0	10	240.59	0.00	0.00	0.00
3	239.32	25.50	61.03	10	0	0	0	10	239.32	0.00	0.00	0.00
4	192.40	23.55	45.31	8	0	0	0	8	192.40	0.00	0.00	0.00
5	144.10	24.85	35.81	6	0	0	0	6	144.10	0.00	0.00	0.00
6	186.86	24.50	45.78	8	0	0	0	8	186.86	0.00	0.00	0.00
7												
8												
9	240.94	22.55	54.33	10	0	0	0	10	240.94	0.00	0.00	0.00
10	240.60	23.30	56.06	10	0	0	0	10	240.60	0.00	0.00	0.00
11	215.74	23.40	50.48	9	0	0	0	9	215.74	0.00	0.00	0.00
12	239.60	23.90	57.26	10	0	0	0	10	239.60	0.00	0.00	0.00
13	213.40	25.05	53.46	9	0	0	0	9	213.40	0.00	0.00	0.00
14												
15												
16	239.82	25.00	59.96	10	0	0	0	10	239.82	0.00	0.00	0.00
17	191.60	26.00	49.82	8	0	0	0	8	191.60	0.00	0.00	0.00
18	144.53	24.90	35.99	6	0	0	0	6	144.53	0.00	0.00	0.00
19	239.33	25.40	60.79	10	0	0	0	10	239.33	0.00	0.00	0.00
20	166.74	25.10	41.85	7	0	0	0	7	166.74	0.00	0.00	0.00
21												
22												
23	239.76	24.45	58.62	10	0	0	0	10	239.76	0.00	0.00	0.00
24	191.50	24.60	47.11	8	0	0	0	8	191.50	0.00	0.00	0.00
25												
26	263.48	24.30	64.03	11	0	0	0	11	263.48	0.00	0.00	0.00
27	239.51	25.75	61.67	10	0	0	0	10	239.51	0.00	0.00	0.00
28												
29												
30	288.61	21.90	63.21	12	0	0	0	12	288.61	0.00	0.00	0.00
31	240.71	23.70	57.05	10	0	0	0	10	240.71	0.00	0.00	0.00
TOTAL	4599.14	24.31	1114.46	192	0	0	0	192	4599.14	0.00	0.00	0.00

NOTES: