DWQ Report to the Compost Operation Stakeholder Advisory Group,
DWQ Report #3: Data characterizing runoff from composting facilities
February 15, 2010

In response to: In our first stakeholder meeting in December 2009, stakeholders requested that DWQ provide any available data relevant to our current posture on water quality permitting in the composting industry. DWQ accepted that homework assignment, and provides the following data summaries for discussion in the February 17, 2010 meeting.

Mecklenburg Co. Compost Central (Type 1 feedstock)
DWQ stormwater permit #NCS000382
DMR Data 2002, 2003, 2007, 2008, 2009

	2002 (outfalls 01, 02)	**2003** (outfalls 01, 02)	**2007**[1] (outfall 01)	**2008**[1] (outfall 02)	**2008** (outfalls 01, 02)	**2009** (outfalls 01, 02)	**Raw sewage range***
Biological Oxygen Demand, BOD (mg/L)	14.3, 50.8	22.3, 31.4	28	3.6	19, 32	130, 90	110-400
Chemical Oxygen Demand, COD (mg/L)	486, 244	842, 247	270	98	700, 310	480, 290	250-1000
Fecal coliform, (#/100 ml)		44,000, 43,000	170,000	1600	300,000, 74,000	93,000 5,900	1,000,000–10,000,000
Ammonia, (mg/L)	0.61, 0.10	0.42, 0.77	0.46	<0.10	0.34, 0.14	0.012, 0.12	12-50
TKN (mg/L)	15, 5.3	19, 5.8	5.9	2.0	8.2, 6.6	7.0, 3.3	
Nitrate+Nitrite (mg/L)	0.14, 0.59	0.24, 0.25	0.15	0.16	0.48, 7.0	<0.05, <0.05	
Phosphorus (mg/L)	3.61, 1.76	10.4, 1.95	2.5	0.11	3.6, 1.7	4.2, 2.8	4-15
pH (SU)			-	6.38	6.5 (02)	6.75 (02)	
Oil &Grease (mg/L)			14	<5.0	6.6, 6.3	<6.0	
Total Suspended Solids, TSS (mg/L)			49	2.6	290, 110	89, 23	100-350

* Wastewater Engineering, Third Edition, Metcalf and Eddy, 1991, p.109-110.

1 Drought conditions in late 2007 prevented the collection of a sample from outfall #02. Compost Central successfully collected a sample in early 2008, for the year 2007, from outfall #02.

Brooks Farm Composting Facility (Type 3)
DWQ stormwater permit #NCS000371
Permit Application and DMR Data

	1998[1], 1999	**2000**	**2001[2]** (two events)	**2003[3], 2004**	**Raw sewage range***
Biological Oxygen Demand, BOD (mg/L)	160, 130	250	<11, <14	482, 122	110-400
Chemical Oxygen Demand, COD (mg/L)	1220, 1600	1360	3130, 372	4040, 1960	250-1000
Fecal coliform, (#/100 ml)	>600,000 13x10e6	>1600	164,000, 6500	82,000, 206,000	1,000,000 – 10,000,000
Ammonia, (mg/L)	- 104	91.3	69, 15	11.3, 96.5	12-50
TKN (mg/L)	156, 87.1	119	157, 29.2	175, 158	
Nitrate+Nitrite (mg/L)	124, 91.5	14.9	32.8, 21.4	17.3, 15.8	
Phosphorus (mg/L)	1.19, 1.75	0.96	1.5, 0.7	3.5, 1.1	4-15
pH (SU)	7.6, 7.6	7.9	7.7, 7.1	7.6, 7.62	
Oil &Grease (mg/L)	<5.0 -				
Total Suspended Solids, TSS (mg/L)	57 -		28, 114	518, 204	100-350

* Wastewater Engineering, Third Edition, Metcalf and Eddy, 1991, p.109-110.

1 This 1998 data was submitted with the initial permit application. Samples were received at the laboratory at 13 degrees C, instead of required 6 degrees C; consultant directed the lab to complete the analyses, and the applicant submitted the data.

2 Drought conditions in the next year, 2002, prevented collection of discharge samples.

3 A second sampling event in 2003 is not reported in this data set because the consultant reported that he sampled from a ditch on site, rather than from a discharging flow.

Wallace Farm Composting Facility (Type 3)
DWQ stormwater permit #NCS000525
DMR Data

	Dec 2008	**June 2009**	**Raw sewage range***
Biological Oxygen Demand, BOD (mg/L)	5	7.1	110-400
Chemical Oxygen Demand, COD (mg/L)	153	101	250-1000
Fecal coliform, (#/100 ml)	2200	6000	1,000,000 – 10,000,000
Ammonia, (mg/L)			12-50
TKN (mg/L)	4.9		
Nitrate+Nitrite (mg/L)	0.98		
Phosphorus (mg/L)	1.1	0.59	4-15
pH (SU)	7.8	6.7	
Oil &Grease (mg/L)			
Total Suspended Solids, TSS (mg/L)	400	510	100-350

* Wastewater Engineering, Third Edition, Metcalf and Eddy, 1991, p.109-110.

Clean Washington Center study data[1]
Published January 2000

	'Yard debris'[2] contact runoff[3] range	Raw sewage range*
BOD (mg/L)	390 – 32,000	110-400
COD (mg/L)		250-1000
Fecal coliform, (#/100 ml)	110 – 4,900,000	1,000,000 – 10,000,000
Ammonia, (mg/L)	23 - 1600	12-50
TKN (mg/L)	85 - 2600	
Nitrate+Nitrite (mg/L)		
Phosphorus (mg/L)	10 - 170	4-15
pH (SU)		
Oil &Grease (mg/L)		
TSS (mg/L)	2000 – 20,000	100-350
Copper (mg/L)	0.07 – 0.8	
Potassium (mg/L)	170 - 4500	
Zinc (mg/L)	0.1 – 1.5	

* Wastewater Engineering, Third Edition, Metcalf and Eddy, 1991, p.109-110.

1 Compost Facility Requirements Guideline, British Columbia Ministry of Water, Land and Air Protection, March 2004, p. 6-2. This guideline was produced to assist composters in complying with the British Columbia Organic Matter Recycling Regulation, 2002. British Columbia cites the earlier work by the Clean Washington Center, and reproduces their data in this Guideline.

The source documents are, Evaluation of Compost Facility Run off for Beneficial Reuse – Phase 1, and same title - Phase 2, Clean Washington Center, January 2000.

2 The data here is reported as originating from 'yard debris composting ' sites; however it appears that the British Columbia Ministry of Water, Land and Air Protection defines yard debris sites more broadly than we do in North Carolina. The sites are described as: a large yard debris and food waste composter, a yard debris site, a site composting manures and brush, and a zoo manure composting site.

3 In this Guideline British Columbia treats non-contact runoff as stormwater, and all other contact waters as 'leachate'.

Oregon study by CH2M Hill [1]
Published May 2004

	Compost Leachate[2]	Compost Runoff[3]	Compost Stormwater[4]	Raw sewage range*
BOD (mg/L)	>41	20 - 3200	4 – 940	110-400
COD (mg/L)	56			250-1000
Fecal coliform, (#/100 ml)	<0.02 – 50,000	200 – 24,000,000	12 – 400,000 (E. Coli)	1,000,000 – 10,000,000
Ammonia, (mg/L)	0.44 – 34.3	0.43 - 1600		12-50
TKN (mg/L)		14 - 3000		
Nitrate+Nitrite (mg/L)	0.96 – 120	0 - 8		
Phosphorus (mg/L)	0.07 - 9	4 - 170	0.57 – 250	4-15
pH (SU)	7.8	6.7 – 9.5	5.3 – 8.2	
Oil &Grease (mg/L)			ND – 23	
TSS (mg/L)		1100 – 20,000	18 - 5000	100-350
Aluminum (mg/L)	0.33			
Copper (mg/L)		0.033 - 0.82	ND – 0.45	
Iron (mg/L)	0.57			
Lead (mg/L)	0.01		0.02 -0.53	
Potassium (mg/L)	2.7	170 - 4600		
Zinc (mg/L)	0.11	0.1 – 1.5	ND – 2.4	

* Wastewater Engineering, Third Edition, Metcalf and Eddy, 1991, p.109-110.

1 Commercial Composting Water Quality Permit Development, prepared for Oregon DEQ Land Quality and Water Quality Divisions, by CH2M Hill, May 12, 2004.

2 Data reported in this column is combined from Tables 2-2, 2-3, and 2-4 on pages 7-9. Several types of facilities are represented in the data, including facilities receiving yard waste, food waste, and manure.

3 Data reported in this column is combined from Tables 2-5 and 2-6 on pages 11-12 from several types of facilities receiving yard waste, food waste, and manure. Note that in the Oregon study, 'runoff' is a non-specific catch all description of the ultimate disposal of the fluids, not a description of the source of the fluids. Runoff is specifically defined in the study as potentially containing stormwater, process stormwater, leachate, and washwater.

4 Data reported in this column is from Table 2-7 on page 13. This is data from multiple years of sampling at a 'green feedstock' site (yard debris, wood waste, vegetative food waste) in Oregon. We note that the table is labeled "Stormwater Data", but it is not clear from the study whether this data is from what North Carolina would call, 'non-contact' stormwater only, or whether it includes both of the Oregon categories of Stormwater (non-contact) and Process Stormwater (contact). North Carolina currently considers contact flows (Oregon's Process Stormwater) as wastewater.

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