Final Biodegradability Report

Project: NAT-2018
Report Date: August 7, 2007

On June 06, 2007 biodegradability testing of Formula 080 (Natural Soap Formulas, Inc.) was initiated and conducted by RespirTek, Inc. according to ASTM E1720-01 (OECD 301B Modified). In this study, Formula 080 was incubated with a dilute inoculum of microbes from a domestic wastewater treatment facility in sealed containers for 20 days. Biodegradability was assessed by measuring carbon dioxide production as dissolved inorganic carbon in the liquid phase after the addition of 10 M sodium hydroxide. It is assumed in the methodology that carbon dioxide gas is the sole product of biodegradation.

The inoculum was collected from the Escatawpa, MS, USA Municipal Wastewater Treatment Plant on May 31, 2007 and conditioned as described in the protocol.

Testing was conducted with no deviations from the protocol. The test results are provided through day 20 when the extent of biodegradation achieved was 66.85%. The testing was halted in accordance with the method given the multiple test days with biodegradation results greater than 60%.

Formula 080 achieved ultimate biodegradability (60% of the theoretical carbon dioxide production) on day 20 (66.85%). It did not achieve ready biodegradability because it did not pass the ten-day window rule (60% production within ten days of exceeding 10%).

All raw data are maintained at Respirek, Inc. 14373 Jim Byrd Road, Biloxi, MS 39532; (228)-392-7977.

Report Date: August 7, 2007
Project ID: NAT-2018
Project Initiation Date: June 6, 2007
Test Method: ASTM E1720-01: OECD 301B Modified
Test Classification: Ready/Ultimate Biodegradability

Test Chemical		Biodegradation Achieved
TC-1	Formula 080	66.85% on Day 20

Test Chemical 1 - Formula 080

	Day 0	Day 2	Day 6	Day 9	Day 13	Day 16	Day 20	Day 23	Day 28	
Blank 1	4.208	4.561	6.166	4.301	4.854	5.771	7.811			
Blank 2	4.66	4.137	7.291	5.636	5.248	5.929	6.567			
Blank 3	4.978	3.672	6.158	4.742	4.444	5.229	7.112			
TC1-1	4.371	5.536	6.285	8.702	9.609	11.69	13.69			
TC1-2	4.388	5.586	7.859	9.107	9.607	12.57	13.6			
TC1-3	4.566	5.356	7.016	8.992	9.963	11.67	14.72			

	Day 0	Day 2	Day 6	Day 9	Day 13	Day 16	Day 20	Day 23	Day 28
Blank Mean	4.62	4.12	6.54	4.89	4.85	5.64	7.16	#DIV/0!	#DIV/0!

Day 0 Product Mean	
TC-1	4.44167

Test Chemical 1 - Micrograms of Inorganic Carbon as CO2

Replicate	Day 0	Day 2	Day 6	Day 9	Day 13	Day 16	Day 20	Day 23	Day 28	
1	0	158.63	-7.97	398.27	493.40	622.07	670.03	#DIV/0!	#DIV/0!	#DIV/0!
2	0	163.63	149.43	438.77	493.20	710.07	661.03	#DIV/0!	#DIV/0!	#DIV/0!
3	0	140.63	65.13	427.27	528.80	620.07	773.03	#DIV/0!	#DIV/0!	#DIV/0!

Organic Carbon Content Per Reactor

Sample ID	TOC	Unit
TC1	10.492	ug/mL

Test Chemical 1 - % Theoretical CO2 Production Realized

Replicate	Day 0	Day 2	Day 6	Day 9	Day 13	Day 16	Day 20	Day 23	Day 28	
1	0	15.12	-0.76	37.96	47.03	59.29	63.86	#DIV/0!	#DIV/0!	#DIV/0!
2	0	15.60	14.24	41.82	47.01	67.68	63.00	#DIV/0!	#DIV/0!	#DIV/0!
3	0	13.40	6.21	40.72	50.40	59.10	73.68	#DIV/0!	#DIV/0!	#DIV/0!

Summary Statistics

Average % Theoretical CO2 Production

Mean	Day 0	Day 2	Day 6	Day 9	Day 13	Day 16	Day 20	Day 23	Day 28
TC1	0.00	14.71	6.56	40.17	48.14	62.02	66.85	#DIV/0!	#DIV/0!

Standard Deviation Between Replicates at Each Sample Point

St. Dev.	Day 0	Day 2	Day 6	Day 9	Day 13	Day 16	Day 20	Day 23	Day 28
TC1	N/A	1.153	7.507	1.989	1.954	4.898	5.931	#DIV/0!	#DIV/0!

95% Confidence Interval Values (+- Value Calculated) at n-1 Degrees of Freedom

95% CI	Day 0	Day 2	Day 6	Day 9	Day 13	Day 16	Day 20	Day 23	Day 28
TC1	N/A	2.862	18.638	4.938	4.850	12.161	14.724	#DIV/0!	#DIV/0!

RespirTek
CONSULTING LABORATORY

Positive Control - Dextrose

	Day 0	Day 2	Day 6	Day 9
Blank 1	4.208	4.561	6.166	4.301
Blank 2	4.66	4.137	7.291	5.636
Blank 3	4.978	3.672	6.158	4.742
Control 1	4.682	10.73	13.65	12.79
Control 2	4.301	8.923	13.25	13.66
Control 3	4.076	11.37	13.41	12.64

	Day 0	Day 2	Day 6	Day 9
Blank Mean	4.62	4.12	6.54	4.89

Day 0 Product Mean	
Control	4.353

Test Chemical 1 - Micrograms of Inorganic Carbon as CO2

Replicate	Day 0	Day 2	Day 6	Day 9
1	0	686.90	737.40	815.93
2	0	506.20	697.40	902.93
3	0	750.90	713.40	800.93

Organic Carbon Content Per Reactor

Sample ID	TOC	Unit
Control	10.352	ug/mL

Test Chemical 1 - % Theoretical CO2 Production Realized

Replicate	Day 0	Day 2	Day 6	Day 9
1	0	66.35	71.23	78.82
2	0	48.90	67.37	87.22
3	0	72.54	68.91	77.37

Summary Statistics

Average % Theoretical CO2 Production (>60% indicates passing conditions)

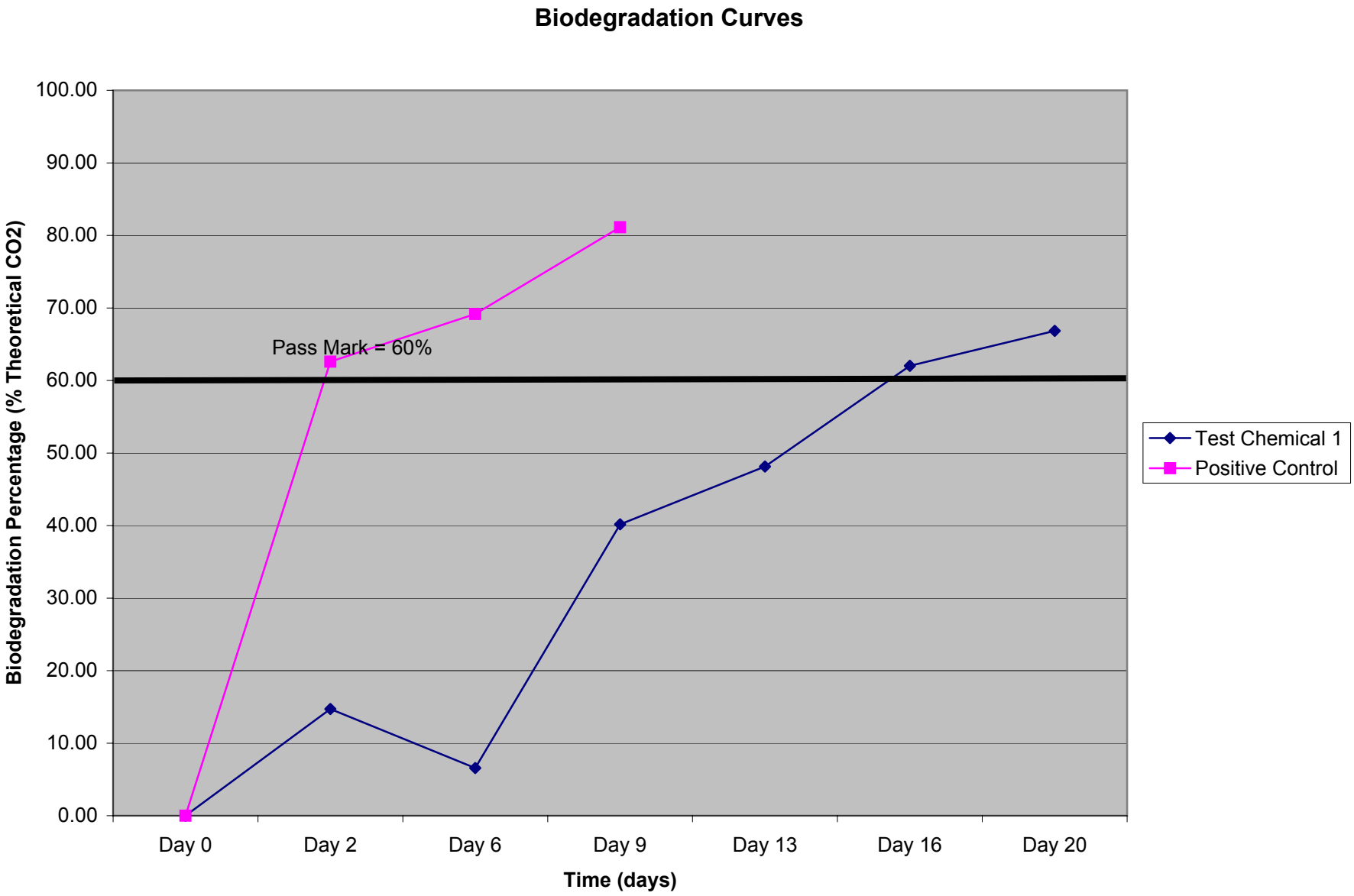
Mean	Day 0	Day 2	Day 6	Day 9
Control	0.00	62.60	69.17	81.14

Standard Deviation Between Replicates at Each Sample Point

St. Dev.	Day 0	Day 2	Day 6	Day 9
Control	N/A	12.259	1.945	5.320

95% Confidence Interval Values (+- Value Calculated) at n-1 Degrees of Freedom

95% CI	Day 0	Day 2	Day 6	Day 9
Control	N/A	30.434	4.828	13.207


Biodegradation Curves
100.00
90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
Biodegradation Percentage (% Theoretical CO2)
Pass Mark = 60%
Day 0
Day 2
Day 6
Day 9
Day 13
Day 16
Day 20
Time (days)
Test Chemical 1
Positive Control