

ASTM D5511-12 - Anaerobic High Solids Biodegradability - 0428150818C

To: [REDACTED]  
Report Number: 0428150818C  
Date: April 28, 2015

Eden Research Laboratory

# Report

From: Thomas Poth - Eden Research Laboratory  
Regarding: 280 day study of [REDACTED] PP Film Samples - ERL #981 & #982

## RESULTS

Thermophilic study for biodegradation, over 280 day period, of [REDACTED] sample resulted in PP Samples (ERL #981 & #982) – 1.0% and 52.9% biodegradation respectively.

## METHOD

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The degree and rate of anaerobic biodegradability of a plastic type material may be predictive of the period required to reduce the proposed plastic from the environment depending on the given conditions. Where disposal is considered a major issue, this test method may be useful to estimate the degree and persistence of biodegradable plastic in a biologically active anaerobic disposal situation. ASTM method D5511-12 determines the degree of anaerobic biodegradation of plastic materials in a high-solids anaerobic conditions. The sample is exposed to methanogenic inoculum cultivated from a wastewater treatment facility's anaerobic digesters and post consumer pretreated household waste. Anaerobic decomposition in this case employs a high solids environment. High solids conditions are usually considered to be greater than 20% solids. The sample conditions remain static.

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This method is designed to yield a percentage of conversion of carbon in the sample to carbon in the gaseous form under conditions found in high-solids anaerobic digesters, treating municipal solid waste. This can be validated using change in mass of the original sample. This method is also designed to resemble many conditions in a biologically active landfill. This method is applicable to all plastic materials that are not toxic to microorganisms. In this method, temperature and moisture are optimized and these conditions are not likely in many landfills. In such cases biodegradation would not be as accelerated.

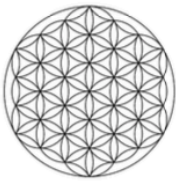
ASTM Method D5511 determines the rate and degree of anaerobic biodegradation by measuring the volume of carbon dioxide (CO<sub>2</sub>) and methane (CH<sub>4</sub>), or change in mass as a function of time (days) of exposure to anaerobic-digester sludge. This method is considered an accelerated representation with respect to anaerobic environments. A managed, biologically active landfill is a prime example of the environment where plastics are disposed.

## INOCULUM

1. Inoculum Characteristics and Preparation
  1. Sludge from Organic Compost – Bernalillo Municipal Compost Facility & Albuquerque Municipal Wastewater Facility
    1. Fifteen day hold period observed @ 53 ± 2°C
    2. Solid Content - 47.5% - The method allows anything greater than 20%. Eden Research Laboratory conducts this test at higher solids to better simulate landfill conditions.
    3. pH - 7.7 - 8.2
    4. Volatile Fatty Acids - 0.7 g/kg
    5. Ammonium Nitrogen 1.4 mg/kg

## SAMPLES THEORETICAL CARBON CONTENT

Sample	Percent Resin	Percent Carbon	Percent Additive	Percent Carbon	Total
981	100.0	83.7	0	72.9	83.7
982	99.0	83.7	1	72.9	83.6



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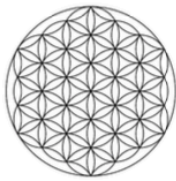
## ASTM D5511-12 - Anaerobic High Solids Biodegradability - 0428150818C

### WEEKLY GAS VOLUMES (mL) @ STP CONTROL SET

Week Begin	IA	IB	IC	NA	NB	NC	PA	PB	PC
<b>23-Jul-14</b>	397.9	490.5	513.6	314.7	615.4	78.7	3276.1	3165.1	3382.6
<b>30-Jul-14</b>	397.9	328.5	199.0	277.6	467.4	236.0	2961.5	3271.5	3104.9
<b>06-Aug-14</b>	296.1	314.7	148.1	268.4	365.6	78.7	180.5	1480.7	1513.1
<b>13-Aug-14</b>	333.2	296.1	9.3	101.8	27.8	60.2	124.9	809.8	809.8
<b>20-Aug-14</b>	78.7	74.0	273.0	41.6	41.6	18.5	185.1	370.2	439.6
<b>27-Aug-14</b>	46.3	32.4	97.2	41.6	18.5	291.5	217.5	157.3	55.5
<b>03-Sep-14</b>	50.9	60.2	46.3	64.8	41.6	305.4	180.5	111.1	41.6
<b>10-Sep-14</b>	41.6	13.9	41.6	37.0	41.6	171.2	106.4	-13.9	64.8
<b>17-Sep-14</b>	32.4	55.5	46.3	60.2	50.9	106.4	175.8	4.6	-23.1
<b>24-Sep-14</b>	199.0	41.6	55.5	74.0	46.3	0.0	199.0	0.0	115.7
<b>01-Oct-14</b>	9.3	74.0	50.9	83.3	50.9	0.0	9.3	-13.9	4.6
<b>08-Oct-14</b>	46.3	50.9	64.8	199.0	13.9	9.3	101.8	-4.6	32.4
<b>15-Oct-14</b>	78.7	60.2	83.3	305.4	27.8	4.6	13.9	-13.9	152.7
<b>22-Oct-14</b>	23.1	69.4	97.2	64.8	208.2	23.1	41.6	-13.9	32.4
<b>29-Oct-14</b>	32.4	46.3	124.9	46.3	55.5	0.0	50.9	-9.3	83.3
<b>05-Nov-14</b>	9.3	41.6	120.3	46.3	41.6	0.0	46.3	0.0	97.2
<b>12-Nov-14</b>	-13.9	37.0	111.1	55.5	32.4	0.0	-13.9	-13.9	46.3
<b>19-Nov-14</b>	23.1	69.4	111.1	41.6	55.5	46.3	37.0	-4.6	46.3
<b>26-Nov-14</b>	9.3	37.0	115.7	46.3	60.2	69.4	60.2	0.0	27.8
<b>03-Dec-14</b>	27.8	328.5	23.1	64.8	60.2	143.4	50.9	23.1	41.6
<b>10-Dec-14</b>	4.6	13.9	41.6	78.7	27.8	203.6	32.4	-18.5	55.5
<b>17-Dec-14</b>	-13.9	50.9	55.5	46.3	46.3	152.7	46.3	-4.6	55.5
<b>24-Dec-14</b>	115.7	41.6	78.7	60.2	37.0	37.0	46.3	-18.5	41.6
<b>31-Dec-14</b>	564.5	32.4	37.0	60.2	50.9	-27.8	37.0	226.7	46.3
<b>07-Jan-15</b>	129.6	18.5	69.4	46.3	50.9	0.0	37.0	97.2	37.0
<b>14-Jan-15</b>	50.9	37.0	50.9	37.0	37.0	-4.6	41.6	60.2	41.6
<b>21-Jan-15</b>	124.9	87.9	37.0	115.7	64.8	106.4	55.5	87.9	50.9
<b>28-Jan-15</b>	92.5	37.0	50.9	27.8	37.0	41.6	23.1	101.8	55.5
<b>04-Feb-15</b>	78.7	37.0	64.8	32.4	37.0	37.0	32.4	64.8	41.6
<b>11-Feb-15</b>	27.8	23.1	27.8	27.8	46.3	50.9	46.3	46.3	41.6
<b>18-Feb-15</b>	50.9	18.5	55.5	60.2	27.8	27.8	64.8	-4.6	60.2
<b>25-Feb-15</b>	50.9	41.6	60.2	50.9	50.9	46.3	78.7	-87.9	50.9
<b>04-Mar-15</b>	60.2	23.1	37.0	37.0	37.0	32.4	46.3	50.9	41.6
<b>11-Mar-15</b>	60.2	41.6	55.5	37.0	37.0	55.5	46.3	32.4	41.6
<b>18-Mar-15</b>	55.5	18.5	41.6	46.3	55.5	27.8	55.5	0.0	37.0
<b>25-Mar-15</b>	50.9	46.3	46.3	46.3	32.4	50.9	55.5	-55.5	37.0
<b>01-Apr-15</b>	4.6	4.6	13.9	13.9	4.6	0.0	13.9	18.5	9.3
<b>08-Apr-15</b>	13.9	0.0	4.6	9.3	9.3	13.9	0.0	9.3	4.6
<b>15-Apr-15</b>	4.6	4.6	0.0	9.3	9.3	4.6	9.3	-4.6	4.6
<b>22-Apr-15</b>	0.0	9.3	0.0	13.9	9.3	9.3	9.3	0.0	4.6

### SAMPLE SET

Week Begin	981A	981B	981C	982A	982B	982C
<b>23-Jul-14</b>	1434.5	1517.8	1624.2	1596.4	4164.6	1661.2
<b>30-Jul-14</b>	50.9	226.7	60.2	134.2	1124.4	536.8
<b>06-Aug-14</b>	50.9	286.9	60.2	106.4	606.2	485.9
<b>13-Aug-14</b>	32.4	282.3	74.0	277.6	199.0	328.5



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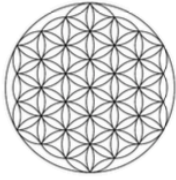
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## ASTM D5511-12 - Anaerobic High Solids Biodegradability - 0428150818C

Week Begin	981A	981B	981C	982A	982B	982C
<b>20-Aug-14</b>	37.0	305.4	286.9	1360.4	837.5	-87.9
<b>27-Aug-14</b>	37.0	323.9	277.6	9.3	-27.8	-41.6
<b>03-Sep-14</b>	74.0	83.3	162.0	236.0	9.3	106.4
<b>10-Sep-14</b>	83.3	46.3	212.9	351.7	171.2	134.2
<b>17-Sep-14</b>	101.8	37.0	101.8	282.3	78.7	120.3
<b>24-Sep-14</b>	92.5	37.0	69.4	472.0	106.4	101.8
<b>01-Oct-14</b>	106.4	23.1	50.9	240.6	23.1	13.9
<b>08-Oct-14</b>	101.8	27.8	50.9	231.4	64.8	64.8
<b>15-Oct-14</b>	106.4	23.1	50.9	407.2	64.8	64.8
<b>22-Oct-14</b>	111.1	27.8	27.8	259.1	97.2	83.3
<b>29-Oct-14</b>	106.4	32.4	50.9	208.2	485.9	254.5
<b>05-Nov-14</b>	92.5	32.4	74.0	124.9	286.9	370.2
<b>12-Nov-14</b>	101.8	32.4	60.2	162.0	393.3	268.4
<b>19-Nov-14</b>	78.7	32.4	55.5	351.7	768.1	393.3
<b>26-Nov-14</b>	50.9	27.8	46.3	231.4	60.2	360.9
<b>03-Dec-14</b>	37.0	46.3	60.2	115.7	87.9	273.0
<b>10-Dec-14</b>	37.0	23.1	23.1	148.1	9.3	379.4
<b>17-Dec-14</b>	46.3	23.1	32.4	226.7	18.5	393.3
<b>24-Dec-14</b>	23.1	32.4	41.6	291.5	-23.1	268.4
<b>31-Dec-14</b>	27.8	27.8	27.8	254.5	-32.4	282.3
<b>07-Jan-15</b>	37.0	60.2	37.0	319.3	92.5	300.8
<b>14-Jan-15</b>	60.2	37.0	37.0	268.4	32.4	263.8
<b>21-Jan-15</b>	55.5	18.5	32.4	259.1	-4.6	365.6
<b>28-Jan-15</b>	46.3	4.6	32.4	273.0	46.3	425.7
<b>04-Feb-15</b>	50.9	23.1	13.9	152.7	41.6	314.7
<b>11-Feb-15</b>	64.8	32.4	32.4	231.4	37.0	333.2
<b>18-Feb-15</b>	55.5	32.4	37.0	536.8	13.9	337.8
<b>25-Feb-15</b>	60.2	37.0	27.8	351.7	23.1	236.0
<b>04-Mar-15</b>	60.2	18.5	41.6	319.3	23.1	282.3
<b>11-Mar-15</b>	41.6	41.6	32.4	273.0	203.6	342.4
<b>18-Mar-15</b>	69.4	13.9	32.4	296.1	638.6	296.1
<b>25-Mar-15</b>	46.3	41.6	37.0	499.7	453.5	273.0
<b>01-Apr-15</b>	9.3	9.3	4.6	60.2	286.9	18.5
<b>08-Apr-15</b>	0.0	4.6	9.3	23.1	245.2	60.2
<b>15-Apr-15</b>	0.0	4.6	0.0	50.9	212.9	46.3
<b>22-Apr-15</b>	0.0	4.6	4.6	55.5	166.6	55.5

### WEEKLY GAS QUALITY (mL) METHANE CONTROL SET

Week Begin	IA	IB	IC	NA	NB	NC	PA	PB	PC
<b>23-Jul-14</b>	124.6	170.7	174.6	96.9	177.2	21.8	1123.7	1148.9	1018.2
<b>30-Jul-14</b>	188.2	144.2	96.5	146.0	244.9	127.7	1634.7	1881.1	1496.6
<b>06-Aug-14</b>	145.4	152.6	76.0	147.1	192.3	41.8	105.4	913.6	755.1
<b>13-Aug-14</b>	168.2	166.1	5.5	62.9	14.7	35.7	73.1	482.6	474.5
<b>20-Aug-14</b>	41.5	40.8	146.3	25.3	24.7	11.2	100.7	226.9	244.0
<b>27-Aug-14</b>	22.2	19.8	56.0	25.8	10.3	170.0	118.3	92.5	29.5
<b>03-Sep-14</b>	26.7	34.8	25.5	41.3	24.7	190.6	100.0	64.6	23.8
<b>10-Sep-14</b>	21.2	8.0	23.5	24.2	24.5	101.5	62.8	-8.9	34.5
<b>17-Sep-14</b>	16.9	33.8	24.3	36.9	30.1	65.3	107.6	3.0	-12.8



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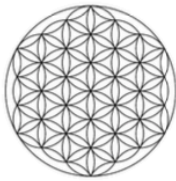
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Week Begin	IA	IB	IC	NA	NB	NC	PA	PB	PC
24-Sep-14	104.1	24.2	30.7	46.5	29.5	0.0	121.0	0.0	63.5
01-Oct-14	4.8	45.9	26.2	50.6	30.6	0.0	5.6	-8.3	2.7
08-Oct-14	22.2	31.4	35.1	124.0	8.5	5.9	59.9	-3.0	18.0
15-Oct-14	42.1	37.5	46.0	198.2	17.9	2.9	8.2	-8.9	88.0
22-Oct-14	12.7	43.2	48.1	38.9	138.3	13.9	25.3	-9.0	18.8
29-Oct-14	18.3	30.2	62.1	28.6	36.4	0.0	30.5	-6.0	47.5
05-Nov-14	5.2	27.4	63.3	30.9	28.3	0.0	28.5	0.0	57.7
12-Nov-14	-7.3	24.2	60.9	36.9	21.7	0.0	-8.1	-9.2	25.9
19-Nov-14	13.4	45.6	58.3	27.5	38.2	31.1	23.0	-3.1	25.9
26-Nov-14	5.0	25.4	63.6	30.2	41.7	45.9	37.4	0.0	16.2
03-Dec-14	16.2	207.6	12.8	42.9	39.5	97.5	32.9	15.0	22.7
10-Dec-14	2.7	9.0	20.9	51.8	18.1	141.1	20.9	-11.7	31.9
17-Dec-14	-8.3	33.5	29.7	30.9	30.7	102.3	30.2	-3.0	31.4
24-Dec-14	64.4	27.7	43.9	41.1	26.9	24.0	28.2	-12.3	23.1
31-Dec-14	325.2	21.0	19.5	40.8	36.6	-18.8	23.6	151.2	28.4
07-Jan-15	76.8	12.3	35.7	31.8	35.3	0.0	23.7	64.4	22.3
14-Jan-15	30.1	24.1	26.5	24.7	25.2	-3.2	26.5	39.4	24.7
21-Jan-15	73.5	58.9	20.0	82.5	41.8	68.9	32.5	61.2	30.9
28-Jan-15	55.3	25.2	26.2	19.6	26.1	27.8	14.2	71.3	31.0
04-Feb-15	44.4	25.0	32.1	22.3	24.3	24.6	19.2	43.6	23.4
11-Feb-15	16.1	14.9	13.9	19.9	30.5	34.4	27.8	31.9	24.5
18-Feb-15	29.3	12.5	29.8	39.8	19.5	18.3	39.6	-3.1	36.1
25-Feb-15	27.8	27.5	30.7	35.9	36.1	33.0	51.1	-58.3	28.5
04-Mar-15	34.5	15.8	18.7	26.3	24.7	23.7	28.8	36.1	24.2
11-Mar-15	36.2	27.9	28.9	24.2	25.9	38.1	29.9	22.6	23.9
18-Mar-15	33.0	12.6	20.4	32.0	38.9	18.9	32.7	0.0	21.2
25-Mar-15	27.8	32.0	24.0	31.9	21.6	34.5	35.8	-37.9	21.8
01-Apr-15	2.6	3.1	7.4	9.6	3.0	0.0	8.4	12.6	5.1
08-Apr-15	7.8	0.0	2.5	6.4	6.1	9.3	0.0	6.5	2.5
15-Apr-15	2.7	3.3	0.0	6.3	6.2	3.1	5.8	-3.3	2.4
22-Apr-15	0.0	6.1	0.0	9.4	6.2	6.6	5.8	0.0	2.5

### METHANE SAMPLE SET

Week Begin	981A	981B	981C	982A	982B	982C
23-Jul-14	86.1	118.4	155.9	480.5	1457.6	526.6
30-Jul-14	25.6	127.0	33.7	68.6	578.0	292.5
06-Aug-14	26.1	146.0	37.2	60.9	303.1	290.5
13-Aug-14	9.3	91.2	22.4	86.3	76.0	106.8
20-Aug-14	19.7	164.0	171.6	731.9	484.1	-51.3
27-Aug-14	20.9	186.9	161.6	5.2	-15.4	-24.8
03-Sep-14	40.8	43.3	95.6	134.8	5.2	64.8
10-Sep-14	45.1	26.8	129.0	201.9	95.9	80.6
17-Sep-14	54.2	20.9	61.4	163.7	43.7	74.2
24-Sep-14	51.9	20.4	40.4	276.6	56.9	65.5
01-Oct-14	55.9	12.8	29.9	135.5	13.1	8.3
08-Oct-14	55.3	15.1	32.7	132.3	40.0	40.6
15-Oct-14	58.5	13.1	30.1	234.5	40.8	40.1
22-Oct-14	57.7	16.3	17.3	149.5	59.8	50.2
29-Oct-14	58.6	19.5	30.7	124.5	288.6	163.9





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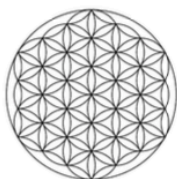
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## ASTM D5511-12 - Anaerobic High Solids Biodegradability - 0428150818C

Week Begin	981A	981B	981C	982A	982B	982C
05-Nov-14	50.3	18.7	48.3	74.3	171.3	228.0
12-Nov-14	59.2	19.0	39.8	97.8	246.6	171.5
19-Nov-14	47.6	18.9	35.0	216.6	463.2	232.1
26-Nov-14	29.6	15.9	29.9	132.8	39.2	227.7
03-Dec-14	22.5	27.4	38.0	71.3	57.1	174.2
10-Dec-14	22.7	13.3	15.0	92.4	6.1	247.4
17-Dec-14	27.9	13.9	21.2	136.9	11.8	257.6
24-Dec-14	13.7	20.3	26.6	184.5	-14.9	174.4
31-Dec-14	16.4	17.3	19.3	165.7	-21.7	183.8
07-Jan-15	23.7	37.1	24.4	212.6	60.8	201.8
14-Jan-15	35.7	22.3	23.6	169.9	20.8	170.4
21-Jan-15	34.8	11.3	22.4	161.2	-3.1	248.9
28-Jan-15	29.2	2.8	21.0	170.9	31.7	288.6
04-Feb-15	30.2	14.1	9.1	98.8	28.3	206.7
11-Feb-15	39.7	19.9	22.4	142.3	23.0	212.2
18-Feb-15	32.9	20.1	25.5	347.8	8.8	211.5
25-Feb-15	36.6	23.4	18.3	226.1	14.8	152.7
04-Mar-15	35.3	11.9	26.6	203.1	15.2	188.6
11-Mar-15	25.7	25.0	22.2	173.1	138.0	214.7
18-Mar-15	40.5	8.5	21.9	191.9	425.3	181.5
25-Mar-15	27.2	26.6	24.2	327.3	293.9	173.9
01-Apr-15	5.3	5.8	3.1	41.1	187.6	12.0
08-Apr-15	0.0	2.9	6.3	14.7	168.5	37.1
15-Apr-15	0.0	2.9	0.0	34.2	145.2	28.1
22-Apr-15	0.0	2.8	3.2	35.9	108.8	34.3

### CARBON DIOXIDE CONTROL SET (mL)

Week Begin	IA	IB	IC	NA	NB	NC	PA	PB	PC
23-Jul-14	225.6	277.1	207.0	130.0	308.9	36.4	2139.3	1867.4	1928.1
30-Jul-14	185.8	161.3	94.5	117.4	185.5	88.5	1214.2	1321.7	1077.4
06-Aug-14	103.4	125.9	61.2	88.6	148.1	33.0	74.4	618.9	578.0
13-Aug-14	108.3	100.1	2.7	35.4	9.7	20.6	46.1	272.1	264.0
20-Aug-14	25.2	20.8	98.6	13.7	14.4	6.9	69.6	116.2	145.5
27-Aug-14	14.9	10.8	36.7	13.3	7.3	92.7	82.0	48.0	19.3
03-Sep-14	15.6	19.0	16.1	22.4	13.0	98.0	65.1	34.4	15.1
10-Sep-14	13.3	4.2	12.8	13.1	14.6	51.9	38.4	-4.3	21.5
17-Sep-14	9.5	18.5	18.0	18.5	19.7	35.9	59.3	1.6	-7.1
24-Sep-14	65.7	12.1	19.5	24.1	14.9	0.0	66.3	0.0	35.4
01-Oct-14	3.0	22.2	16.3	28.3	19.0	0.0	3.5	-4.6	1.4
08-Oct-14	14.3	17.6	20.0	62.5	4.6	2.9	36.2	-1.6	10.6
15-Oct-14	26.8	18.2	27.2	104.4	10.1	1.6	4.8	-4.4	47.6
22-Oct-14	7.7	19.7	32.3	20.5	73.7	7.8	13.9	-4.4	9.7
29-Oct-14	11.1	15.7	45.4	15.5	20.3	0.0	18.7	-2.7	29.1
05-Nov-14	2.7	12.7	46.7	14.3	14.3	0.0	17.6	0.0	29.8
12-Nov-14	-4.6	11.4	37.4	18.3	12.5	0.0	-5.0	-4.7	17.4
19-Nov-14	7.4	24.2	35.5	13.8	18.4	15.6	13.0	-1.4	16.0
26-Nov-14	3.0	12.8	43.4	14.4	19.7	22.0	22.7	0.0	9.5
03-Dec-14	9.7	106.8	7.1	23.3	19.1	50.1	19.4	8.3	13.3
10-Dec-14	1.3	4.7	13.7	25.8	9.4	59.5	10.5	-5.5	19.6



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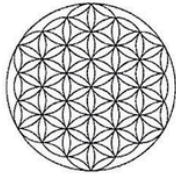
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## ASTM D5511-12 - Anaerobic High Solids Biodegradability - 0428150818C

Week Begin	IA	IB	IC	NA	NB	NC	PA	PB	PC
<b>17-Dec-14</b>	-4.2	17.2	19.8	16.0	17.2	52.4	16.1	-1.4	18.4
<b>24-Dec-14</b>	36.7	13.7	29.3	19.1	12.6	11.2	17.1	-5.7	15.0
<b>31-Dec-14</b>	186.9	11.1	11.8	20.3	17.9	-9.6	13.4	70.7	13.8
<b>07-Jan-15</b>	37.1	5.5	23.1	15.5	19.1	0.0	12.1	32.2	11.4
<b>14-Jan-15</b>	17.3	11.8	15.8	12.6	13.4	-1.4	15.5	19.4	11.9
<b>21-Jan-15</b>	43.7	27.3	12.4	38.8	25.7	34.0	20.3	27.7	15.7
<b>28-Jan-15</b>	32.9	12.8	16.5	9.6	13.2	13.3	8.1	29.7	18.5
<b>04-Feb-15</b>	23.2	11.5	22.5	10.0	12.7	11.0	10.7	20.7	13.7
<b>11-Feb-15</b>	8.8	7.9	8.9	9.2	17.2	17.3	17.0	17.5	13.6
<b>18-Feb-15</b>	15.3	6.4	21.2	20.4	10.5	8.7	22.8	-1.5	19.4
<b>25-Feb-15</b>	18.6	13.6	19.9	18.3	19.0	15.7	27.5	-32.4	16.9
<b>04-Mar-15</b>	20.8	7.7	14.0	12.4	13.0	11.5	15.6	17.8	13.4
<b>11-Mar-15</b>	20.2	13.2	20.0	13.1	13.0	20.3	16.7	11.3	13.1
<b>18-Mar-15</b>	18.0	6.6	15.5	14.7	20.6	7.7	17.5	0.0	13.2
<b>25-Mar-15</b>	17.5	15.3	16.3	13.5	10.6	17.6	19.6	-18.8	11.8
<b>01-Apr-15</b>	1.5	1.4	4.5	4.3	1.7	0.0	4.5	6.0	3.2
<b>08-Apr-15</b>	4.5	0.0	1.5	3.2	3.5	4.7	0.0	2.9	1.5
<b>15-Apr-15</b>	1.4	1.5	0.0	3.3	3.3	1.4	3.1	-1.6	1.5
<b>22-Apr-15</b>	0.0	3.1	0.0	4.9	3.4	2.9	3.1	0.0	1.6

### CARBON DIOXIDE SAMPLE SET

Week Begin	981A	981B	981C	982A	982B	982C
<b>23-Jul-14</b>	652.7	648.1	677.3	739.1	1520.1	717.6
<b>30-Jul-14</b>	21.8	98.4	28.4	54.1	512.7	222.2
<b>06-Aug-14</b>	19.4	118.2	26.7	43.5	240.7	208.9
<b>13-Aug-14</b>	10.9	92.6	26.4	86.6	71.2	107.4
<b>20-Aug-14</b>	13.8	135.6	141.2	515.6	378.6	-42.3
<b>27-Aug-14</b>	16.0	142.8	121.1	3.6	-12.5	-17.3
<b>03-Sep-14</b>	30.7	36.1	69.6	89.4	4.3	47.6
<b>10-Sep-14</b>	31.7	21.4	87.9	150.9	78.9	56.2
<b>17-Sep-14</b>	42.6	16.5	41.0	110.1	33.2	56.2
<b>24-Sep-14</b>	35.7	15.5	29.4	189.7	46.4	45.4
<b>01-Oct-14</b>	39.8	10.5	23.6	94.8	10.1	6.0
<b>08-Oct-14</b>	40.7	11.9	22.2	96.9	27.9	27.7
<b>15-Oct-14</b>	43.2	10.9	21.2	151.9	29.3	28.8
<b>22-Oct-14</b>	47.3	11.8	11.1	104.4	43.2	35.9
<b>29-Oct-14</b>	43.8	13.4	22.0	89.5	214.3	113.3
<b>05-Nov-14</b>	35.5	14.2	33.5	49.8	134.0	164.0
<b>12-Nov-14</b>	41.3	14.5	26.3	70.1	175.4	114.9
<b>19-Nov-14</b>	33.7	14.1	25.3	128.7	345.7	186.4
<b>26-Nov-14</b>	21.8	12.1	20.8	86.1	28.2	159.2
<b>03-Dec-14</b>	14.4	21.4	26.6	48.6	38.3	118.8
<b>10-Dec-14</b>	15.2	10.4	10.9	59.4	4.1	173.4
<b>17-Dec-14</b>	17.4	10.3	15.2	93.6	8.6	179.0
<b>24-Dec-14</b>	9.7	13.9	19.0	112.2	-9.8	122.9
<b>31-Dec-14</b>	11.7	11.8	11.5	98.2	-13.9	115.7
<b>07-Jan-15</b>	13.9	26.9	16.1	117.2	40.8	138.1
<b>14-Jan-15</b>	25.4	14.7	17.7	110.8	15.0	111.6
<b>21-Jan-15</b>	23.3	8.4	14.1	105.2	-1.9	178.0



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# Report

## ASTM D5511-12 - Anaerobic High Solids Biodegradability - 0428150818C

Week Begin	981A	981B	981C	982A	982B	982C
28-Jan-15	20.1	2.1	15.2	106.5	20.3	206.5
04-Feb-15	20.6	10.6	5.8	57.9	17.8	150.1
11-Feb-15	27.4	14.6	13.1	89.3	15.4	137.6
18-Feb-15	24.7	13.4	15.8	244.8	6.7	157.1
25-Feb-15	24.4	15.5	12.6	136.5	9.2	109.3
04-Mar-15	24.7	8.1	20.3	122.9	10.0	120.0
11-Mar-15	17.9	17.6	15.3	100.7	95.3	157.5
18-Mar-15	28.0	6.3	15.0	116.7	279.1	142.7
25-Mar-15	20.4	18.7	17.8	186.9	188.2	125.3
01-Apr-15	3.5	4.3	1.9	22.9	117.3	7.6
08-Apr-15	0.0	2.1	4.1	9.0	110.6	27.3
15-Apr-15	0.0	2.3	0.0	21.5	97.3	20.8
22-Apr-15	0.0	2.0	1.9	21.8	69.8	26.1

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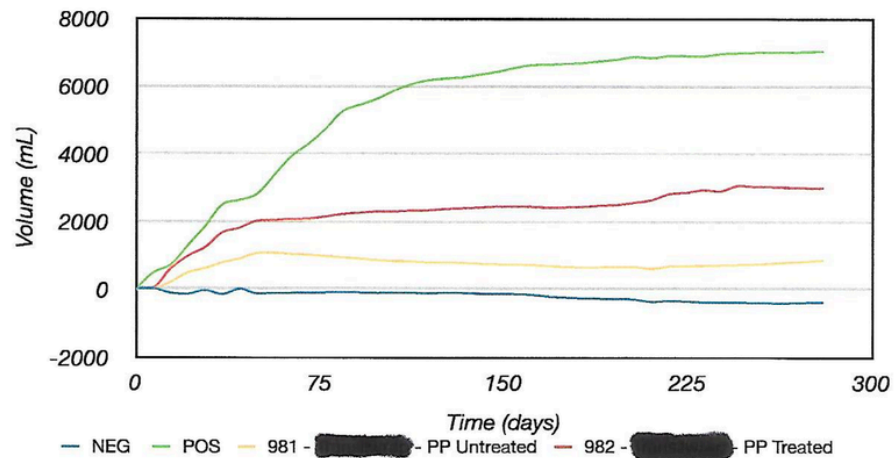
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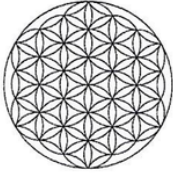
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### DATA ANALYSIS

	Inculum	Negative	Positive	981 - PP Untreated	982 - PP Treated
Cumulative Gas Volume (mL)	3305.4	2876.6	9839.2	3871.5	11634.6
Percent CH <sub>4</sub> (%)	51.9	58.6	48.6	37.7	54.6
Volume CH <sub>4</sub> (mL)	1715.2	1685.2	4782.7	1457.7	6350.6
Mass CH <sub>4</sub> (g)	1.23	1.20	3.42	1.04	4.54
Percent CO <sub>2</sub> (%)	37.5	36.2	44.8	42.7	41.8
Volume CO <sub>2</sub> (mL)	1239.5	1041.2	4409.8	1654.8	4867.1
Mass CO <sub>2</sub> (g)	2.43	2.05	8.66	3.25	9.56
Sample Mass (g)	1,000	10	10	10	10
Theoretical Sample Mass (g)	0.0	8.6	4.4	8.4	8.4
Biodegraded Mass (g)	1.58	1.46	4.92	1.67	6.01
Percent Biodegraded (%)		-1.4	75.6	1.0	52.9

### Cumulative Gas Volume (Background Corrected)





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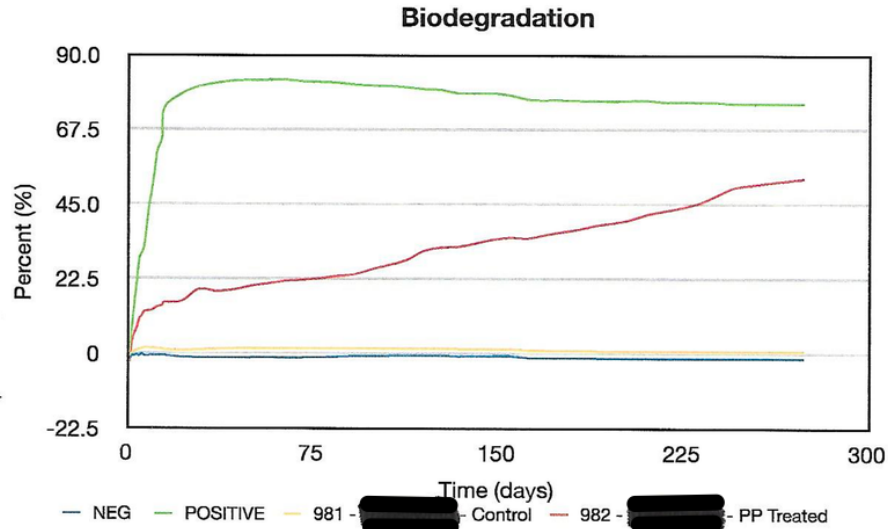
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## ASTM D5511-12 - Anaerobic High Solids Biodegradability - 0428150818C

### CONCLUSION

Upon consideration of gas production analysis, it becomes obvious that biodegradation has occurred in the study sample. It appears that a linear slope has developed for this sample. It appears sample ERL#982 is continuing to biodegrade.



Prediction of time to total biodegradation of sample 982 has not been determined but is likely to continue. Over a 280 day period the [redacted] PP samples indicates 1% for the untreated PP sample and about 53% biodegradation for the PP treated sample. These ERL#982 results are very good. Sample #982 easily surmounted the let down rate of the bio-additive. It is important to note that negative movement in biodegradation is the result of the inoculum outperforming the sample or control.

The positive control has surmounted the required 70%+ biodegradation after approximately 17 days. These samples will go through many biological cycles as they biodegrade. It seems the syntrophic effect of the microbes has been fulfilled for this sample. It is not uncommon for this to take up to 90+ days before the microbial colonies reach a quorum.

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