

Eden Research Laboratory

To: BioSphere

Date: August 3, 2016

From: Thomas Poth

Number of pages including cover: 1

Regarding: ASTM D 5511-11 test update for Clear PET - 1301 days

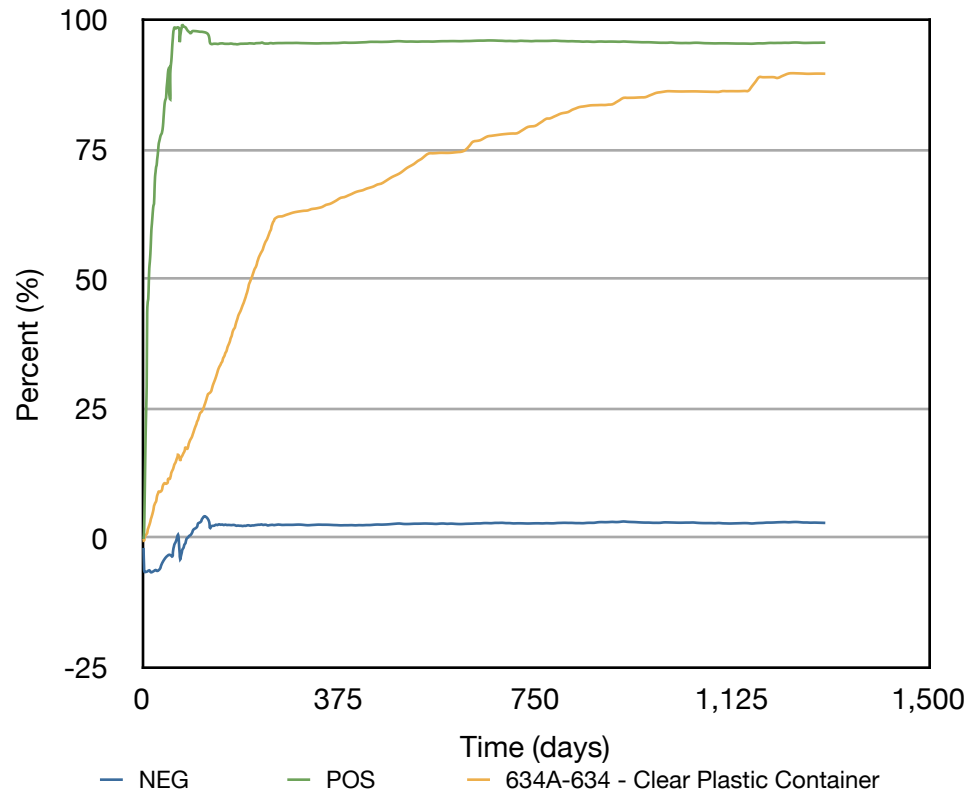
Update

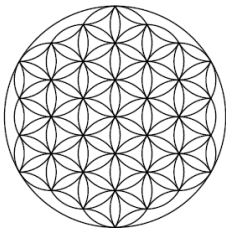
2111 Menaul NE, Suite A
Albuquerque, NM 87107
T 505.508.3994
M 505.550.9316

thomas.poth@edenresearchlab.com

	Inculum	Negative	Positive	634 - Clear Plastic Container
Cumulative Gas Volume (mL)	4383.6	4573.3	13675.2	28086.2
Percent CH ₄ (%)	45.0	54.2	44.1	51.5
Volume CH ₄ (mL)	1974.2	2480.7	6031.6	14474.4
Mass CH ₄ (g)	1.41	1.77	4.31	10.34
Percent CO ₂ (%)	39.4	36.2	40.4	35.0
Volume CO ₂ (mL)	1728.8	1655.6	5523.4	9834.8
Mass CO ₂ (g)	3.40	3.25	10.85	19.32
Sample Mass (g)	1,000	10	10	20.0
Theoretical Sample Mass (g)	0.0	8.6	4.4	12.4
Biodegraded Mass (g)	1.98	2.22	6.19	13.02
Percent Biodegraded (%)		2.7	95.2	89.2

Biodegradation





Eden Research Laboratory

To: Biosphere

Date: April 12, 2024

From: Thomas Poth

Number of pages including cover: 1z

Regarding: ASTM D5511 Biosphere Study update (1850 days)

Update

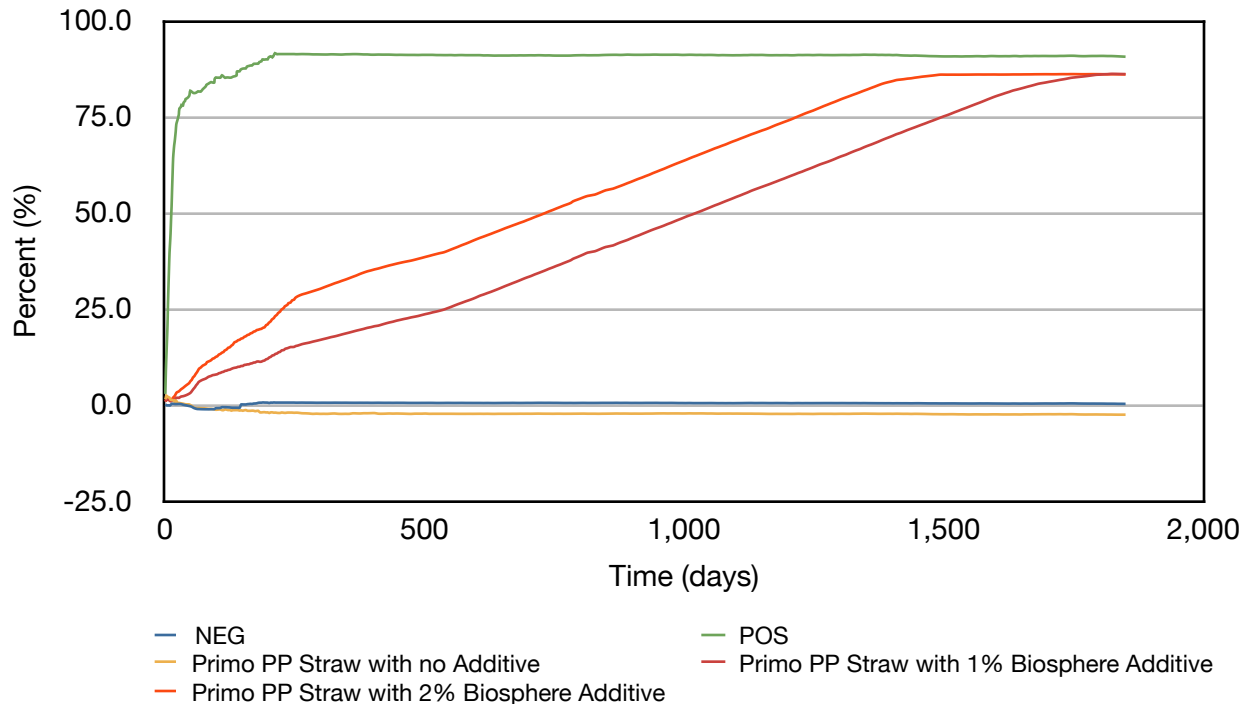
2412 Princeton NE, Suite E
 Albuquerque, NM 87107
 T 505.508.3994
 M 505.550.9316

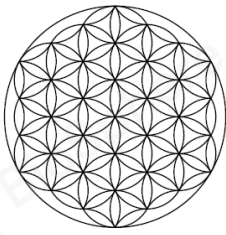
thomas.poth@edenresearchlab.com

	Inoculum	Negative	Positive	Primo PP Straw with no Additive	Primo PP Straw with 1% Biosphere Additive	Primo PP Straw with 2% Biosphere Additive
Cumulative Gas Volume (mL)	2120.8	2194.9	10818.6	1644.2	24571.0	24594.1
Percent CH ₄ (%)	47.3	47.6	41.1	35.4	54.3	53.9
Volume CH ₄ (mL)	1002.9	1044.6	4451.0	581.7	13339.7	13255.1
Mass CH ₄ (g)	0.72	0.75	3.18	0.42	9.53	9.47
Percent CO ₂ (%)	38.3	37.3	41.6	39.4	34.9	35.2
Volume CO ₂ (mL)	813.2	818.8	4499.2	648.1	8586.2	8652.2
Mass CO ₂ (g)	1.60	1.61	8.84	1.27	16.87	17.00
Sample Mass (g)	10	10	10	20.0	20.0	20
Theoretical Sample Mass (g)	0.0	8.6	4.2	12.5	12.5	12.5
Biodegraded Mass (g)	0.97	1.00	4.79	0.66	11.75	11.74
Percent Biodegraded (%)		0.3	90.6	-2.5	86.0	86.0
* Adjusted Percent Biodegraded (%)		0.3	100.0	-2.8	95.0	94.9

* The adjusted % biodegraded values are for informational purposes. It is not part of the method and will not be reported in the final report.

Biodegradation





Eden Research Laboratory

To: BioSphere

Date: March 22, 2016

From: Thomas Poth

Number of pages including cover: 1

Regarding: ASTM D 5511-11 test update for White Bags LDPE- 856 days

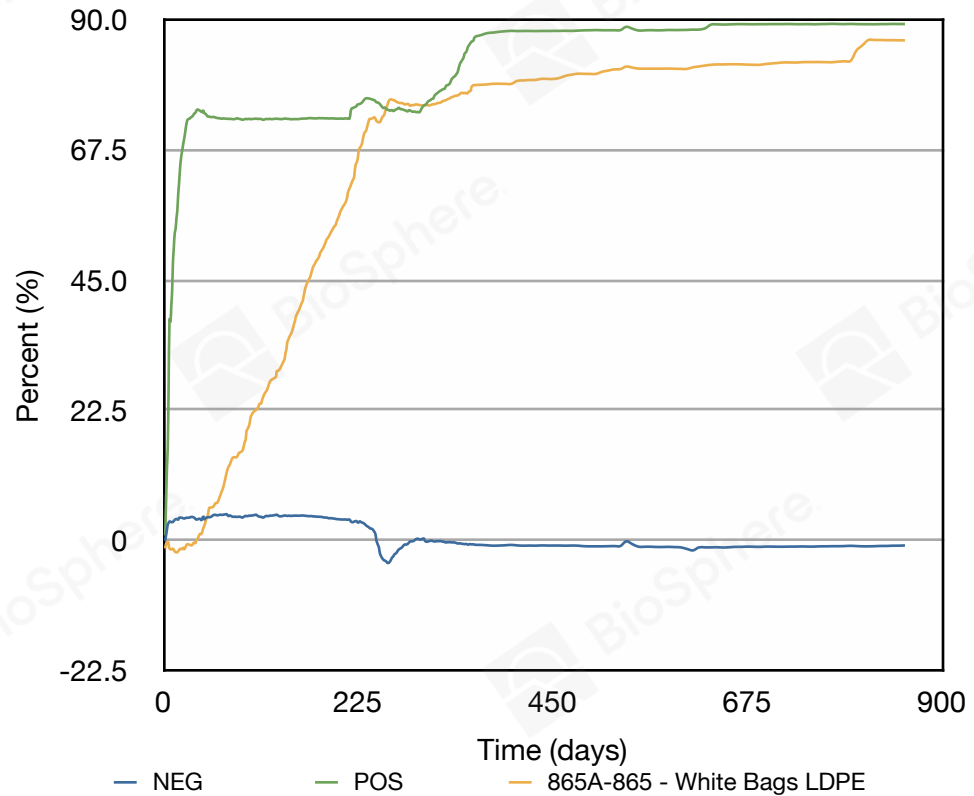
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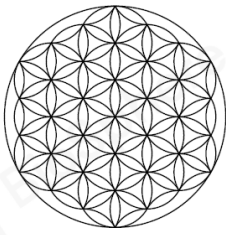
2111 Menaul NE, Suite A
 Albuquerque, NM 87107
 T 505.508.3994
 M 505.550.9316

thomas.poth@edenresearchlab.com

	Inculum	Negative	Positive	865 - White Bags LDPE
Cumulative Gas Volume (mL)	2375.4	2289.0	11198.1	14608.4
Percent CH ₄ (%)	44.2	41.6	41.8	53.9
Volume CH ₄ (mL)	1049.1	951.4	4678.3	7877.8
Mass CH ₄ (g)	0.75	0.68	3.34	5.63
Percent CO ₂ (%)	40.3	38.8	41.9	35.5
Volume CO ₂ (mL)	957.7	887.9	4690.2	5186.1
Mass CO ₂ (g)	1.88	1.74	9.21	10.19
Sample Mass (g)	1,000	10	10	8.0
Theoretical Sample Mass (g)	0.0	8.6	4.4	6.9
Biodegraded Mass (g)	1.08	0.99	5.02	7.00
Percent Biodegraded (%)		-1.0	89.2	86.4

Biodegradation





Eden Research Laboratory

To: Biosphere

Date: August 7, 2021

From: Thomas Poth

Number of pages including cover: 2

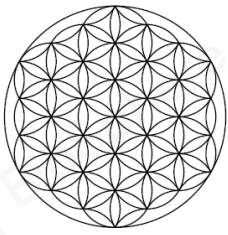
Regarding: D7475 Biosphere Samples (1139 days)

Up -

2412 Princeton NE, Suite E
 Albuquerque, NM 87107
 T 505.508.3994
 M 505.550.9316
 thomas.poth@edenresearch-
 lab.com

	Inocu- lum	Negative	Positive	1845 - High - PE Stan- dard	1846 - High - PE with Bis- Sphere
Percent Solid				35	35
Cumulative Atmos	2.36	2.46	5.76	1.97	18.28
Cumulative Gas Volume (mL)	3641.7	3802.1	8906.0	3046.3	28248.2
Percent CH ₄ (%)	47.4	52.1	49.7	50.9	52.2
Volume CH ₄ (mL)	1726.5	1980.0	4423.9	1549.3	14757.0
Mass CH ₄ (g)	1.23	1.41	3.16	1.11	10.54
Percent CO ₂ (%)	50.5	41.8	61.7	42.5	41.7
Volume CO ₂ (mL)	1837.8	1589.9	5493.4	1296.0	11793.5
Mass CO ₂ (g)	3.61	3.12	10.79	2.55	23.17
Sample Mass (g)	10	10	10	17.0	17.0
Theoretical Sample Mass (g)	0.0	8.6	4.2	14.6	14.6
Biodegraded Mass (g)	1.91	1.91	5.31	1.52	14.22
Percent Biodegraded (%)		0.0	80.6	-2.6	84.5

	Inocu- lum	Negative	Positive	1843 - Medium - PE Stan- dard	1844 - Medium - PE with Bis- Sphere
Percent Solid				45	45
Cumulative Atmos	2.45	2.35	6.34	2.44	16.83
Cumulative Gas Volume (mL)	3780.5	3634.3	9794.5	3772.5	26000.8
Percent CH ₄ (%)	48.6	51.2	50.5	51.4	52.8
Volume CH ₄ (mL)	1837.9	1862.1	4948.5	1940.4	13720.1
Mass CH ₄ (g)	1.31	1.33	3.53	1.39	9.80
Percent CO ₂ (%)	47.8	43.4	58.5	41.3	40.8
Volume CO ₂ (mL)	1807.6	1577.6	5732.4	1557.7	10596.7
Mass CO ₂ (g)	3.55	3.10	11.26	3.06	20.81
Sample Mass (g)	10	10	10	17.0	17.0
Theoretical Sample Mass (g)	0.0	8.6	4.2	14.6	14.6
Biodegraded Mass (g)	1.95	1.84	5.72	1.87	13.03
Percent Biodegraded (%)		-1.3	89.3	-0.5	76.0

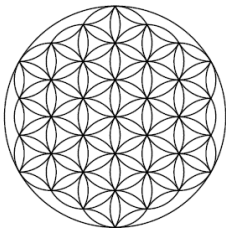


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Up -

2412 Princeton NE, Suite E
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 thomas.poth@edenresearch-
 lab.com

	Inocu- lum	Nega- tive	Positive	1841 - Low - PE Stan- dard	1842 - Low - PE with Bis- Sphere
Percent Solid				60	60
Cumulative Atmos	2.57	2.20	7.19	3.15	14.62
Cumulative Gas Volume (mL)	3965.6	3396.4	11113.3	4866.4	22585.9
Percent CH ₄ (%)	50.2	49.8	49.2	52.0	53.7
Volume CH ₄ (mL)	1992.2	1693.1	5465.3	2529.3	12139.0
Mass CH ₄ (g)	1.42	1.21	3.90	1.81	8.67
Percent CO ₂ (%)	44.2	46.0	51.6	40.1	38.9
Volume CO ₂ (mL)	1754.4	1563.9	5732.4	1951.2	8786.2
Mass CO ₂ (g)	3.45	3.07	11.26	3.83	17.26
Sample Mass (g)	10	10	10	17.0	17.0
Theoretical Sample Mass (g)	0.0	8.6	4.2	14.6	14.6
Biodegraded Mass (g)	2.01	1.74	6.00	2.40	11.21
Percent Biodegraded (%)		-3.1	94.6	2.7	63.2



Eden Research Laboratory

To: Biosphere

Date: April 12, 2024

From: Thomas Poth

Number of pages including cover: 1

Regarding: ASTM D 5511-18 update for Biosphere Study - 1572 days

Update

2412 Princeton NE, Suite E

Albuquerque, NM 87107

T 505.508.3994

M 505.550.9316

thomas.poth@edenresearchlab.com

	Inoculum	Negative	Positive	APEX LDPE FILM CONTROL	APEX LDPE FILM W/ BIOS-PHERE
Cumulative Gas Volume (mL)	6876.2	6365.6	15307.1	6573.9	36234.9
Percent CH ₄ (%)	52.7	52.3	45.6	48.1	53.5
Volume CH ₄ (mL)	3623.5	3328.5	6986.7	3163.4	19385.4
Mass CH ₄ (g)	2.59	2.38	4.99	2.26	13.85
Percent CO ₂ (%)	35.9	36.0	40.3	36.0	34.9
Volume CO ₂ (mL)	2470.0	2292.3	6171.3	2363.9	12652.6
Mass CO ₂ (g)	4.85	4.50	12.12	4.64	24.85
Sample Mass (g)	10	10	10	20.0	20.0
Theoretical Sample Mass (g)	0.0	8.6	4.2	17.1	17.1
Biodegraded Mass (g)	3.26	3.01	7.05	2.96	17.16
Percent Biodegraded (%)		-3.0	89.7	-1.8	81.1
* Adjusted Percent Biodegraded (%)		-3.3	100.0	-2.0	90.4

* Outside of the ASTM D5511 method and on the assumption that the positive control (Cellulose) will fully biodegrade, all value have been proportionally adjusted.

Biodegradation

