



ENGINEERING | SURVEYING | CONSTRUCTION SERVICES  
 DEFINING QUALITY SINCE 1965



**To:** Attn: Ms. Victoria Venegas  
 New Mexico EMNRD  
 Oil Conservation Division  
 811 S. First Street  
 Artesia, NM 88210

**From:** David Roybal

**Date:** January 29, 2021

**Subject:** Longfellow Energy – Impound 24 Variance for Secondary Liner

On behalf of Longfellow Energy, Pettigrew and Associates is requesting a variance to Section 19.15.34.12(A)(4) requiring secondary liner to be 30-mil LLDPE string reinforced. Longfellow Energy is requesting approval to use 40-mil HDPE liner.

The proposed 40-mil HDPE liner is an appropriate material to be use in the impoundment due to multiple factors. The proposed liner will be thicker than required and will provide a stronger, tougher and weather (UV) resistant option with a higher density. A thicker liner will also benefit the construction of the pond as it is less likely to be damaged during the installation process.

With the leakage through a geomembrane liner being directly a function of the height of liquid head above any hole or imperfection, upgrading from a 30-mil to a 40-mil thickness will decrease the probability of leakage during the pond’s operational life.

It is in my professional opinion that the 40-mil HDPE liner as a secondary liner will provide equal or better protection of fresh water, public health and the environment. Attached with this request is a sample specification sheet for the previously mentioned 40-HDPE liner. Additionally, specifications for a 30-mil HDPE liner have been provided for comparison.

If you have any questions or require additional information regarding the secondary liner variance, please contact me.

Sincerely,



David Roybal, PE  
 NM License # 23576



## HDPE 7000 Series, 40 mil Black, Smooth

PROPERTY	TEST METHOD	FREQUENCY <sup>(1)</sup>	UNIT Imperial	1102193
<b>SPECIFICATIONS</b>				
Thickness (Nominal ±10%) (11)	ASTM D5199	Every roll	mils	40
Resin Density	ASTM D1505	Certified	g/cc	> 0.932
Melt Index - 190/2.16 (max.)	ASTM D1238	Certified	g/10 min	1.0
Sheet Density	ASTM D792	1/Batch	g/cc	≥ 0.940
Carbon Black Content	ASTM D4218	Every 2 rolls	%	2.0 - 3.0
Carbon Black Dispersion	ASTM D5596	Every 10 rolls	Category	Cat. 1 & Cat. 2
OIT - standard (avg.)	ASTM D3895	Per formulation	min	100
Tensile Properties (min. avg) (2)	ASTM D6693	Every 5 rolls		
Strength at Yield			ppi	85.7
Elongation at Yield			%	12
Strength at Break			ppi	154.2
Elongation at Break			%	700
Tear Resistance (min. avg.)	ASTM D1004	Every 10 rolls	lbf	24
Puncture Resistance (min. avg.)	ASTM D4833	Every 10 rolls	lbf	72
Dimensional Stability	ASTM D1204	Certified	%	± 2
Stress Crack Resistance (SP-NCTL)	ASTM D5397	1/Batch	hr	500
Oven Aging - % retained after 90 days	ASTM D5721	Per formulation		
HP OIT (min. avg.)	ASTM D5885		%	80
UV Res. - % retained after 1600 hr	ASTM D7238	Per formulation		
HP-OIT (min. avg.)	ASTM D5885		%	50
<b>SUPPLY SPECIFICATIONS(Roll dimensions may vary ±1%)</b>				
Roll Dimension - Width	-		ft	22.5
Roll Dimension - Length	-		ft	940
Area (Surface/Roll)	-		ft <sup>2</sup>	21150

### NOTES

1. Testing frequency based on standard roll dimensions and one batch is approximately 180,000 lbs (or one railcar).
2. Machine Direction (MD) and Cross Machine Direction (XMD or TD) average values should be on the basis of 5 specimens each direction.
11. The minimum average thickness is ± 10% of the nominal value.

\* All values are nominal test results, except when specified as minimum or maximum.

\* The information contained herein is provided for reference purposes only and is not intended as a warranty of guarantee. Final determination of suitability for use contemplated is the sole responsibility of the user. SOLMAX assumes no liability in connection with the use of this information.

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## HDPE 7000 Series, 30 mil Black, Smooth

PROPERTY	TEST METHOD	FREQUENCY <sup>(1)</sup>	UNIT Imperial	1102187
<b>SPECIFICATIONS</b>				
Thickness (Nominal ±10%) (11)	ASTM D5199	Every roll	mils	30
Resin Density	ASTM D1505	Certified	g/cc	> 0.932
Melt Index - 190/2.16 (max.)	ASTM D1238	Certified	g/10 min	1.0
Sheet Density	ASTM D792	1/Batch	g/cc	≥ 0.940
Carbon Black Content	ASTM D4218	Every 2 rolls	%	2.0 - 3.0
Carbon Black Dispersion	ASTM D5596	Every 10 rolls	Category	Cat. 1 & Cat. 2
OIT - standard (avg.)	ASTM D3895	Per formulation	min	100
Tensile Properties (min. avg) (2)	ASTM D6693	Every 5 rolls		
Strength at Yield			ppi	63
Elongation at Yield			%	12
Strength at Break			ppi	114
Elongation at Break			%	700
Tear Resistance (min. avg.)	ASTM D1004	Every 10 rolls	lbf	18
Puncture Resistance (min. avg.)	ASTM D4833	Every 10 rolls	lbf	54
Dimensional Stability	ASTM D1204	Certified	%	± 2
Stress Crack Resistance (SP-NCTL)	ASTM D5397	1/Batch	hr	500
Oven Aging - % retained after 90 days	ASTM D5721	Per formulation		
HP OIT (min. avg.)	ASTM D5885		%	80
UV Res. - % retained after 1600 hr	ASTM D7238	Per formulation		
HP-OIT (min. avg.)	ASTM D5885		%	50
<b>SUPPLY SPECIFICATIONS(Roll dimensions may vary ±1%)</b>				
Roll Dimension - Width	-		ft	22.5
Roll Dimension - Length	-		ft	1240
Area (Surface/Roll)	-		ft <sup>2</sup>	27900

### NOTES

1. Testing frequency based on standard roll dimensions and one batch is approximately 180,000 lbs (or one railcar).
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