



November 7, 2013
December 2, 2013 Updated with SP-NCTL results
February 21, 2014 Updated with assessment clarification

Mail To:

Naomi Azulai
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Dear Ms. Azulai:

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs. TRI is pleased to submit this final report for laboratory testing.

Bill To:

<= Same

Project: Roan Creek Evaporation Pond

TRI Job Reference Number: E2386-15-03

Material(s) Tested: Two 40 mil. Ten year old Liner Smooth HDPE Geomembrane(s)

Test(s) Requested: Thickness (ASTM D 5199)
Density (ASTM D 1505)
Carbon Content (ASTM D 1603, mod.)
Carbon Dispersion (ASTM D 5596)
Tensile (ASTM D 6693)
Puncture Strength (ASTM D 4833)
Tear Resistance (ASTM D 1004)
Oxidative Induction Time (ASTM D 3895)
SP-NCTL Stress Crack Resistance (ASTM D 5397, App)

Geomembrane Assessment

Both the exposed and trench geomembrane material appear to be in relatively good condition. Minimal OIT remains suggesting that, while the material is in good condition and does not need to be replaced currently, continued monitoring should be practiced as the onset of degradation is likely in the next few months and years as the antioxidant package is completely consumed. However, the existing material demonstrates good mechanical strength and ductility. Stress crack resistance testing was terminated shortly after 300 hour test duration and we note that this measurement demonstrates compliance with GRI GM 13 requirements for resistance to stress cracking.

TRI recommends that this geomembrane material be monitored again in 5 years for continued performance.

If you have any questions or require any additional information, please call us at 1-800-880-8378.

Sincerely,

Sam Allen
Vice President
Geosynthetic Services Division
www.GeosyntheticTesting.com



GEOMEMBRANE TEST RESULTS

TRI Client: Maralex Resources, Inc.
Project: Roan Creek Evaporation Pond

Material: 40 mil. Smooth HDPE Geomembrane (Ten year old material)
Sample Identification: Exposed
TRI Log #: E2386-15-03

| PARAMETER | TEST REPLICATE NUMBER | | | | | | | | | | MEAN | STD. DEV. | GM 13 SPEC. |
|--|-------------------------|-------|-------|-----|-----|----|----|----|----|----|------|-----------|-------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | | | |
| Thickness (ASTM D 5199) | | | | | | | | | | | | | |
| Thickness (mils) | 42 | 41 | 41 | 40 | 42 | 41 | 40 | 42 | 42 | 41 | 41 | 40 | 36 |
| | | | | | | | | | | | | << min | |
| Density (ASTM D 1505) | | | | | | | | | | | | | |
| Density (g/cm3) | 0.951 | 0.951 | 0.951 | | | | | | | | | 0.000 | > 0.94 |
| Carbon Black Content (ASTM D 1603, mod.) | | | | | | | | | | | | | |
| % Carbon Black | 2.60 | 2.63 | | | | | | | | | | 0.02 | 2-3 |
| Carbon Black Dispersion (ASTM D 5596) | | | | | | | | | | | | | |
| Rating - 1st field view | 1 | 1 | 1 | 1 | 1 | | | | | | | | 1 |
| Rating - 2nd field view | 1 | 1 | 1 | 1 | 1 | | | | | | | | 1 |
| Tensile Properties (ASTM D 6693, 2 ipm strain rate) | | | | | | | | | | | | | |
| MD Yield Strength (ppi) | 107 | 120 | 114 | 117 | 116 | | | | | | | 5 | 84 |
| TD Yield Strength (ppi) | 128 | 132 | 127 | 125 | 121 | | | | | | | 4 | 84 |
| MD Break Strength (ppi) | 184 | 198 | 198 | 193 | 169 | | | | | | | 12 | 152 |
| TD Break Strength (ppi) | 197 | 200 | 179 | 139 | 171 | | | | | | | 25 | 152 |
| MD Yield Elongation (%) | 21 | 21 | 21 | 21 | 21 | | | | | | | 0 | 12 |
| TD Yield Elongation (%) | 18 | 18 | 18 | 18 | 18 | | | | | | | 0 | 12 |
| MD Break Elongation (%) | 739 | 731 | 799 | 771 | 648 | | | | | | | 57 | 700 |
| TD Break Elongation (%) | 844 | 835 | 771 | 616 | 764 | | | | | | | 91 | 700 |
| Puncture Resistance (ASTM D 4833) | | | | | | | | | | | | | |
| Puncture Strength (lbs) | 110 | 109 | 109 | 108 | 108 | | | | | | | 1 | 72 |
| Tear Resistance (ASTM D 1004) | | | | | | | | | | | | | |
| MD Tear Strength (lbs) | 36 | 33 | 31 | 35 | 34 | 35 | 33 | 33 | 35 | 34 | | 1 | 28 |
| TD Tear Strength (lbs) | 34 | 34 | 32 | 34 | 30 | 33 | 33 | 28 | 32 | 33 | | 2 | 28 |
| MD Machine Direction | TD Transverse Direction | | | | | | | | | | | | |

The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.



GEOMEMBRANE TEST RESULTS

TRI Client: Maralex Resources, Inc.
Project: Roan Creek Evaporation Pond

Material: 40 mil. Smooth HDPE Geomembrane (Ten year old material)
Sample Identification: Exposed
TRI Log #: E2386-15-03

| PARAMETER | TEST REPLICATE NUMBER | | | | | | | | | | MEAN | STD. DEV. | GM 13 SPEC. | |
|---|-----------------------|--------------------------|------|------|----------------------|------|------------|---|---|----|----------|-----------|-------------|-------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | | | | |
| Oxidative Induction Time (ASTM D 3895) | | | | | | | | | | | | | | |
| OIT (minutes) | 20.8 | 21.4 | | | | | | | | | | 21.1 | 0.4 | > 100 |
| SP-NCTL Stress Crack Resistance (ASTM D 5397, App) | | | | | | | | | | | | | | |
| SURFACTANT: | | CO-630 | | | | | | | | | | | | |
| EXPOSURE PERIOD: | | 300 hrs | | | | | | | | | | | | |
| DATE TEST STARTED: | | 4-Nov-13 | | | | | | | | | | | | |
| TEST TEMPERATURE: | | 50C | | | | | | | | | | | | |
| Transverse direction yield stress: | | 3030 (psi) | | | Mechanical Advantage | | 5 | | | | | | | |
| x 30% | | 909 (x 0.30) | | | Lever Weight | | 0.33 (lbs) | | | | | | | |
| x hinge thickness (in) | | 0.032 (80% of thickness) | | | Grip Weight | | 0.09 (lbs) | | | | | | | |
| x specimen width | | 0.124 (0.125") | | | | | | | | | | | | |
| Load | | 3.61 (lbs) | | | | | | | | | | | | |
| Applied load = (Load - Lever Weight + Grip Weight)/Mechanical Advantage = | | | | | | | | | | | 0.67 lbs | = | 306 | grams |
| Replicate No.: | | 1 | 2 | 3 | 4 | 5 | | | | | | | | |
| No. Hours to Failure: | | >300 | >300 | >300 | >300 | >300 | | | | | | >300 | > 300 | |

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GEOMEMBRANE TEST RESULTS

TRI Client: Maralex Resources, Inc.
Project: Roan Creek Evaporation Pond

Material: 40 mil. Smooth HDPE Geomembrane (Ten year old material)
Sample Identification: Anchor Trench
TRI Log #: E2386-15-03

| PARAMETER | TEST REPLICATE NUMBER | | | | | | | | | | MEAN | STD. DEV. | GM 13 SPEC. |
|--|-------------------------|-------|-------|-----|-----|----|----|----|----|----|------|-----------|-------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | | | |
| Thickness (ASTM D 5199) | | | | | | | | | | | | | |
| Thickness (mils) | 40 | 41 | 41 | 42 | 42 | 42 | 40 | 41 | 40 | 42 | 41 | 1 | 40 |
| | | | | | | | | | | | | << min | 36 |
| Density (ASTM D 1505) | | | | | | | | | | | | | |
| Density (g/cm3) | 0.947 | 0.947 | 0.947 | | | | | | | | | 0.000 | > 0.94 |
| Carbon Black Content (ASTM D 1603, mod.) | | | | | | | | | | | | | |
| % Carbon Black | 2.16 | 2.13 | | | | | | | | | | 0.02 | 2-3 |
| Carbon Black Dispersion (ASTM D 5596) | | | | | | | | | | | | | |
| Rating - 1st field view | 1 | 1 | 1 | 1 | 1 | | | | | | | | 1 |
| Rating - 2nd field view | 1 | 1 | 1 | 1 | 1 | | | | | | | | 1 |
| Tensile Properties (ASTM D 6693, 2 ipm strain rate) | | | | | | | | | | | | | |
| MD Yield Strength (ppi) | 109 | 109 | 122 | 122 | 110 | | | | | | | 7 | 84 |
| TD Yield Strength (ppi) | 136 | 118 | 114 | 122 | 109 | | | | | | | 10 | 84 |
| MD Break Strength (ppi) | 145 | 86 | 191 | 212 | 196 | | | | | | | 51 | 152 |
| TD Break Strength (ppi) | 218 | 175 | 169 | 230 | 175 | | | | | | | 28 | 152 |
| MD Yield Elongation (%) | 17 | 17 | 15 | 15 | 15 | | | | | | | 1 | 12 |
| TD Yield Elongation (%) | 15 | 20 | 20 | 15 | 18 | | | | | | | 3 | 12 |
| MD Break Elongation (%) | 501 | 89 | 804 | 878 | 869 | | | | | | | 338 | 700 |
| TD Break Elongation (%) | 906 | 614 | 636 | 975 | 655 | | | | | | | 170 | 700 |
| Puncture Resistance (ASTM D 4833) | | | | | | | | | | | | | |
| Puncture Strength (lbs) | 115 | 114 | 109 | 110 | 110 | | | | | | | 3 | 72 |
| Tear Resistance (ASTM D 1004) | | | | | | | | | | | | | |
| MD Tear Strength (lbs) | 35 | 33 | 34 | 36 | 31 | 31 | 34 | 27 | 31 | 33 | | 3 | 28 |
| TD Tear Strength (lbs) | 34 | 32 | 31 | 35 | 32 | 34 | 34 | 29 | 35 | 29 | | 2 | 28 |
| MD Machine Direction | TD Transverse Direction | | | | | | | | | | | | |

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GEOMEMBRANE TEST RESULTS

TRI Client: Maralex Resources, Inc.
Project: Roan Creek Evaporation Pond

Material: 40 mil. Smooth HDPE Geomembrane (Ten year old material)
Sample Identification: Anchor Trench
TRI Log #: E2386-15-03

| PARAMETER | TEST REPLICATE NUMBER | | | | | | | | | | MEAN | STD. DEV. | GM 13 SPEC. | | |
|---|-----------------------|--------------------------|----------------|----------------|----------------------|----------------|------------|---|---|----|------------|----------------|-------------|-------|--|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | | | | | |
| Oxidative Induction Time (ASTM D 3895) | | | | | | | | | | | | | | | |
| OIT (minutes) | 29.5 | 29.8 | | | | | | | | | | 29.6 | 0.2 | > 100 | |
| SP-NCTL Stress Crack Resistance (ASTM D 5397, App) | | | | | | | | | | | | | | | |
| SURFACTANT: | | CO-630 | | | | | | | | | | | | | |
| EXPOSURE PERIOD: | | 300 hrs | | | | | | | | | | | | | |
| DATE TEST STARTED: | | 4-Nov-13 | | | | | | | | | | | | | |
| TEST TEMPERATURE: | | 50C | | | | | | | | | | | | | |
| Transverse direction yield stress: | | 2880 (psi) | | | Mechanical Advantage | | 5 | | | | | | | | |
| x 30% | | 864 (x 0.30) | | | Lever Weight | | 0.33 (lbs) | | | | | | | | |
| x hinge thickness (in) | | 0.032 (80% of thickness) | | | Grip Weight | | 0.09 (lbs) | | | | | | | | |
| x specimen width | | 0.124 (0.125") | | | | | | | | | | | | | |
| Load | | 3.43 (lbs) | | | | | | | | | | | | | |
| Applied load = (Load - Lever Weight + Grip Weight)/Mechanical Advantage = | | | | | | | | | | | 0.64 lbs = | | 290 | grams | |
| Replicate No.: | | | | | | | | | | | | | | | |
| No. Hours to Failure: | | 1 | 2 | 3 | 4 | 5 | | | | | | >300 | > 300 | | |
| | | >300 | >300 | >300 | >300 | >300 | | | | | | >300 | > 300 | | |

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