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APPENDIX H.1 – RESUMES OF INSTALLATION PERSONNEL

EXPERIENCE SUMMARY

Mr. Trevor Simmons has over 30 years of experience in the geosynthetic industry. He has supervised and installed over 150,000,000 square feet of numerous types of geosynthetic material from all major manufacturers. Mr. Simmons has performed and supervised projects ranging up to 7,000,000 square feet. He has experience installing and supervising the installation of HDPE, LLDPE, XR-5, geocomposite clay liner (GCL), geocomposite, geotextiles, polypropylene, and PVC liners.

Mr. Simmons' experience includes international work in Canada, England, the Bahamas, the United Arab Emirates, and Laos. His current responsibilities include coordination of 15 field superintendents and as many as 200 foremen, quality control technicians, operators, laborers, and welding technicians through the construction season.

RELEVANT EXPERIENCE

General Superintendent, Tetra Tech, Inc., Richfield, OH, 2013 - Present

- As a general superintendent, Mr. Simmons oversees the completion of both ordinary and extraordinary geosynthetics installation. The ordinary include normal wastewater ponds and landfill cells, while the extraordinary include many emergency landfill projects where quality and safety are critical. These emergency projects require a high level of competence and communication with multiple trades to meet customer and legal requirements. Crew sizes ranged from 10 to 40 people.

General Superintendent, American Environmental Group, Ltd., Richfield, OH, 2005 - 2012

- As a general superintendent, Mr. Simmons oversaw the completion of both ordinary and extraordinary geosynthetics installation. The ordinary included normal wastewater ponds and landfill cells, while the extraordinary included many emergency landfill projects where quality and safety are critical. These emergency projects required a high level of competence and communication with multiple trades to meet customer and legal requirements. Crew sizes ranged from 10 to 40 people.

Project Manager, Geo-Synthetics Inc., Waukesha, WI, 2004 - 2005

- As a project manager, Mr. Simmons was responsible for all aspects of construction on installation projects throughout the United States. He managed between 2 and 8 geosynthetic crews on a continual basis. His duties included P&L management, materials management, crew scheduling, daily coordination with clients, invoicing of contract and extra work items. Mr. Simmons was responsible for overall client satisfaction. His duties also included interviewing, screening, and selecting candidates for employment.

AREA OF EXPERTISE

- Geosynthetics Installation

TRAINING/CERTIFICATIONS

OSHA 30-hr. Construction Outreach
 OSHA 8-hr. Supervisor and Competent Person Training
 OSHA 10-hr. Construction Outreach
 MSHA 24-hr. New Miner
 MSHA 8-hr. Refresher
 CPR/First Aid Training
 Instructor - Powered Industrial Truck

OFFICE

Richfield, OH

YEARS OF EXPERIENCE

Since 1989 (32 years)

YEARS WITHIN FIRM

Since 2005 (16 years)

CONTACT

trevor.simmons@tetrattech.com

Project Manager, COMANCO Environmental Corporation, Baton Rouge, LA, 2002 – 2003

- As a project manager, Mr. Simmons was responsible for all aspects of construction on installation projects in his Southeast Region. He managed between 2 and 6 geosynthetic crews on a continual basis. His duties included P&L management, materials management, crew scheduling, daily coordination with clients, invoicing of contract and extra work items. Mr. Simmons was responsible for overall client satisfaction.

Superintendent to Project Manager, Serrot International, Inc./National Seal Company, Baton Rouge, LA, 1992 – 2002

- Responsible for the supervision of field geosynthetics installation crews of 10 to 45 technicians and laborers. Mr. Simmons successfully completed installations in the U.S., Canada, England, the Bahamas, and the United Arab Emirates. He coordinated project duties with other on-site contractors to meet required guidelines and goals.

Senior Engineering Technician, Geosyntec Consultants, Consulting Engineers, Boca Raton, FL, 1990 – 1992

- Mr. Simmons was responsible for the documentation of all relevant aspects of landfill construction. He reviewed material certifications to ensure compliance with project specifications. Mr. Simmons coordinated with the owner, earthwork contractor, and installation contractor on a daily basis and facilitated problem/resolution meetings as necessary. He performed on-site testing of materials and prepared documentation for inclusion into final reports for submittal to state regulatory agencies for approval.

Senior Technician, National Seal Company, Galesburg, IL, 1989 – 1990

- Installation of various liner systems, including HDPE, LLDPE, Polypropylene, VLDPE, and PVC. Experienced with operating all types of geosynthetic welding equipment.

ADDITIONAL EQUIPMENT

- Wheel Loaders - various sizes
- Bobcat Loaders - various sizes
- Backhoe/Loader combination - various sizes
- Forklifts - rubber tired, various sizes
- Aerial Lifts - various sizes
- Excavators - various sizes
- Bulldozers - various sizes

Sinhxay Sundara – Master Seamer		
Company History	Years of Experience	Materials
American Environmental Group, LTD.	2005 - Present	Geomembrane HDPE, LLDPE, XR-5, PVC, Geosynthetic Clay Liner (GCL), Geonet, Geocomposite, Geotextiles
American Environmental Group, LTD.	April 23, 2009 - 2014	IAGI CWT 032009 Certified Welding Technician
Geo-Synthetic, Inc.	2000 - 2005	Geomembrane HDPE, LLDPE, XR-5, PVC, Geosynthetic Clay Liner (GCL), Geonet, Geocomposite, Geotextiles
GSE	1995 - 2000	Geomembrane HDPE, LLDPE, XR-5, PVC, Geosynthetic Clay Liner (GCL), Geonet, Geocomposite, Geotextiles

A Geosynthetic Master Seamer has a minimum of 30 million square feet of geosynthetic material installation experience.

Jorge Louis Olvera – Master Seamer/Foreman		
Company History	Years of Experience	Materials
American Environmental Group, LTD.	2011 - Present	Geomembrane HDPE, LLDPE, XR-5, PVC, Geosynthetic Clay Liner (GCL), Geonet, Geocomposite, Geotextiles
ESI	2010-2011	Geomembrane HDPE, LLDPE, XR-5, PVC, Geosynthetic Clay Liner (GCL), Geonet, Geocomposite, Geotextiles
GSE	2007-2008	Geomembrane HDPE, LLDPE, XR-5, PVC, Geosynthetic Clay Liner (GCL), Geonet, Geocomposite, Geotextiles

A Geosynthetic Master Seamer/Foreman has a minimum of 30 million square feet of geosynthetic material installation experience.

Fredy O. Chirinos – Technician		
Company History	Years of Experience	Materials
American Environmental Group, LTD.	2015 - Present	Geomembrane HDPE, LLDPE, XR-5, PVC, Geosynthetic Clay Liner (GCL), Geonet, Geocomposite, Geotextiles

A Geosynthetic Technician has a minimum of 1 million square feet of geosynthetic material installation experience.

Alvino Gonzalez – Technician		
Company History	Years of Experience	Materials
American Environmental Group, LTD.	2011 - Present	Geomembrane HDPE, LLDPE, XR-5, PVC, Geosynthetic Clay Liner (GCL), Geonet, Geocomposite, Geotextiles
GSE Lining Technology, Inc.	2010 – 2010	Geomembrane HDPE, LLDPE, XR-5, PVC, Geosynthetic Clay Liner (GCL), Geonet, Geocomposite, Geotextiles

A Geosynthetic Technician has a minimum of 1 million square feet of geosynthetic material installation experience.

Peter Seekins – Operator		
Company History	Years of Experience	Materials
American Environmental Group, LTD.	2015 - Present	Geomembrane HDPE, LLDPE, XR-5, PVC, Geosynthetic Clay Liner (GCL), Geonet, Geocomposite, Geotextiles

A Geosynthetic Master Seamer has a minimum of 30 million square feet of geosynthetic material installation experience.

Alejandro Solano – Master Seamer		
Company History	Years of Experience	Materials
American Environmental Group, LTD.	2010 - Present	Geomembrane HDPE, LLDPE, XR-5, PVC, Geosynthetic Clay Liner (GCL), Geonet, Geocomposite, Geotextiles
GSE Lining Technology, Inc.	2002 - 2010	Geomembrane HDPE, LLDPE, Geosynthetic Clay Liner (GCL), Geonet, Geocomposite, Geotextiles
Serrot International, Inc.	1995 – 2002	Geomembrane HDPE, LLDPE, Geosynthetic Clay Liner (GCL), Geonet, Geocomposite, Geotextiles

A Geosynthetic Master Seamer has a minimum of 30 million square feet of geosynthetic material installation experience.

Walter Lira-Guzman – Technician		
Company History	Years of Experience	Materials
American Environmental Group, LTD.	2012 - Present	Geomembrane HDPE, LLDPE, XR-5, PVC, Geosynthetic Clay Liner (GCL), Geonet, Geocomposite, Geotextiles

A Geosynthetic Technician has a minimum of 1 million square feet of geosynthetic material installation experience.

David Solano – Technician in Training		
Company History	Years of Experience	Materials
American Environmental Group, LTD.	2022 - Present	Geomembrane HDPE, LLDPE, XR-5, PVC, Geosynthetic Clay Liner (GCL), Geonet, Geocomposite, Geotextiles

A Geosynthetic Technician in training is working on having a minimum of 1 million square feet of geosynthetic material installation experience.

Guadalupe Salinas – Master Seamer		
Company History	Years of Experience	Materials
American Environmental Group, LTD.	2010 - Present	Geomembrane HDPE, LLDPE, XR-5, PVC, Geosynthetic Clay Liner (GCL), Geonet, Geocomposite, Geotextiles
GSE Lining Technology, Inc.	1995 - 2010	Geomembrane HDPE, LLDPE, Geosynthetic Clay Liner (GCL), Geonet, Geocomposite, Geotextiles

A Geosynthetic Master Seamer has a minimum of 30 million square feet of geosynthetic material installation experience.



APPENDIX H.2 – 100-MIL LLDPE GEOMEMBRANE INVENTORY CONTROL

VLF 2 Phase 3

Stage A.1 Record of Construction

100-mil LLDPE Geomembrane Site Inventory Control

Roll Number	Resin Lot Number	Width (ft)	Length (ft)	Area (sf)	Conformance Test	Agru QC Certification	Resin Certification	Site Delivery Date
FND0091860004	DNM810400	23	335	7,705	x	x	x	04/29/22
FND0091860005	DNM810400	23	335	7,705		x	x	04/29/22
FND0091860006	DNM810400	23	335	7,705		x	x	04/29/22
FND0091860007	DNM810400	23	335	7,705		x	x	04/29/22
FND0091860008	DNM810400	23	335	7,705		x	x	04/29/22
FND0091860009	DNM810400	23	335	7,705		x	x	04/29/22
FND0091860010	DNM810400	23	335	7,705		x	x	04/29/22
FND0091860011	DNM810400	23	335	7,705		x	x	04/29/22
FND0091860012	DNM810400	23	335	7,705		x	x	04/29/22
FND0091860013	DNM810400	23	335	7,705		x	x	04/29/22
FND0091860014	DNM810400	23	335	7,705		x	x	04/29/22
FND0091860015	DNM810400	23	335	7,705		x	x	04/29/22
FND0091860016	DNM810400	23	335	7,705		x	x	04/29/22
FND0091860017	DNM810400	23	335	7,705		x	x	04/29/22
FND0091860018	DNM810400	23	335	7,705		x	x	04/29/22
FND0091860019	DNM810400	23	335	7,705		x	x	04/29/22
FND0091860020	DNM810400	23	335	7,705		x	x	04/29/22
FND0091860021	DNM810400	23	335	7,705		x	x	04/29/22
FND0091860022	DNM810400	23	335	7,705		x	x	04/29/22
FND0091860023	DNM810400	23	335	7,705	x	x	x	04/29/22
FND0091860024	DNM810400	23	335	7,705		x	x	04/29/22
FND0091860025	DNM810400	23	335	7,705		x	x	04/29/22
FND0091860026	DNM810400	23	335	7,705		x	x	04/29/22
FND0091860027	DNM810400	23	335	7,705		x	x	04/29/22
FND0091860028	DNM810400	23	335	7,705		x	x	05/05/22
FND0091860029	DNM810400	23	335	7,705		x	x	05/05/22
FND0091860030	DNM810400	23	335	7,705		x	x	05/05/22
FND0091860031	DNM810400	23	335	7,705		x	x	05/05/22
FND0091860032	DNM810400	23	335	7,705		x	x	05/05/22
FND0091860033	DNM810400	23	335	7,705		x	x	05/05/22
FND0091860034	DNM810400	23	335	7,705		x	x	05/05/22
FND0091860035	DNM810400	23	335	7,705		x	x	05/05/22
FND0091860036	DNM810400	23	335	7,705		x	x	05/05/22
FND0091860037	DNM810400	23	335	7,705		x	x	05/05/22
FND0091860038	DNM810400	23	335	7,705		x	x	5/5/2022?
FND0091860039	DNM810400	23	335	7,705		x	x	5/5/2022?
FND0091860040	DNM810400	23	335	7,705		x	x	05/04/22
FND0091860041	DNM810400	23	335	7,705		x	x	05/04/22
FND0091860042	DNM810400	23	335	7,705	x	x	x	05/04/22
FND0091860043	DNM810400	23	335	7,705		x	x	05/04/22
FND0091860044	DNM810400	23	335	7,705		x	x	05/04/22
FND0091860045	DNM810400	23	335	7,705		x	x	05/04/22
FND0091860046	DNM810400	23	335	7,705		x	x	05/04/22

VLF 2 Phase 3

Stage A.1 Record of Construction

100-mil LLDPE Geomembrane Site Inventory Control

Roll Number	Resin Lot Number	Width (ft)	Length (ft)	Area (sf)	Conformance Test	Agru QC Certification	Resin Certification	Site Delivery Date
FND0091860047	DNM810400	23	335	7,705		x	x	05/04/22
FND0091860048	DNM810400	23	335	7,705		x	x	05/04/22
FND0091860049	DNM810400	23	335	7,705		x	x	05/04/22
FND0091860050	DNM810400	23	335	7,705		x	x	05/04/22
FND0091860051	DNM810400	23	335	7,705		x	x	05/04/22
FND0091860052	DNM810400	23	335	7,705		x	x	05/02/22
FND0091860053	DNM810400	23	335	7,705		x	x	05/02/22
FND0091860054	DNM810400	23	335	7,705		x	x	05/02/22
FND0091860055	DNM810400	23	335	7,705		x	x	05/02/22
FND0091860056	DNM810400	23	335	7,705		x	x	05/02/22
FND0091860057	DNM810400	23	335	7,705		x	x	05/02/22
FND0091860058	DNM810400	23	335	7,705		x	x	05/02/22
FND0091860059	DNM810400	23	335	7,705		x	x	05/02/22
FND0091860060	DNM810400	23	335	7,705		x	x	05/02/22
FND0091860061	DNM810400	23	335	7,705	x	x	x	05/02/22
FND0091860062	DNM810400	23	335	7,705		x	x	05/02/22
FND0091860063	DNM810400	23	335	7,705		x	x	05/02/22
FND0091860064	DNM810400	23	335	7,705		x	x	04/29/22
FND0091860065	DNM810400	23	335	7,705		x	x	04/29/22
FND0091860066	DNM810400	23	335	7,705		x	x	04/29/22
FND0091860067	DNM810400	23	335	7,705		x	x	04/29/22
FND0091860068	DNM810400	23	335	7,705		x	x	04/29/22
FND0091860069	DNM810400	23	335	7,705		x	x	04/29/22
FND0091860070	DNM810400	23	335	7,705		x	x	04/29/22
FND0091860071	DNM810400	23	335	7,705		x	x	04/29/22
FND0091860072	DNM810400	23	335	7,705		x	x	04/29/22
FND0091860073	DNM810400	23	335	7,705		x	x	04/29/22
FND0091860074	DNM810400	23	335	7,705		x	x	04/29/22
FND0091860075	DNM810400	23	335	7,705		x	x	04/29/22
FND0091860076	DNM810400	23	335	7,705		x	x	05/06/22
FND0091860077	DNM810400	23	335	7,705		x	x	05/06/22
FND0091860078	DNM810400	23	335	7,705		x	x	05/06/22
FND0091860079	DPB810030	23	335	7,705		x	x	05/06/22
FND0091860080	DPB810030	23	335	7,705	x	x	x	05/06/22
FND0091860081	DPB810030	23	335	7,705		x	x	05/06/22
FND0091860082	DPB810030	23	335	7,705		x	x	05/06/22
FND0091860083	DPB810030	23	335	7,705		x	x	05/06/22
FND0091860085	DPB810030	23	335	7,705		x	x	05/06/22
FND0091860086	DPB810030	23	335	7,705		x	x	05/06/22
FND0091860087	DPB810030	23	335	7,705		x	x	05/06/22
FND0091860088	DPB810030	23	335	7,705		x	x	05/06/22
FND0091860089	DPB810030	23	335	7,705		x	x	05/04/22
FND0091860090	DPB810030	23	335	7,705		x	x	05/04/22
FND0091860091	DPB810030	23	335	7,705		x	x	05/04/22

VLF 2 Phase 3

Stage A.1 Record of Construction

100-mil LLDPE Geomembrane Site Inventory Control

Roll Number	Resin Lot Number	Width (ft)	Length (ft)	Area (sf)	Conformance Test	Agru QC Certification	Resin Certification	Site Delivery Date
FND0091860092	DPB810030	23	335	7,705		x	x	05/04/22
FND0091860093	DPB810030	23	335	7,705		x	x	05/04/22
FND0091860094	DPB810030	23	335	7,705		x	x	05/04/22
FND0091860095	DPB810030	23	335	7,705		x	x	05/04/22
FND0091860096	DPB810030	23	335	7,705		x	x	05/04/22
FND0091860097	DPB810030	23	335	7,705		x	x	05/04/22
FND0091860098	DPB810030	23	335	7,705		x	x	05/04/22
FND0091860099	DPB810030	23	335	7,705		x	x	05/04/22
FND0091860100	DPB810030	23	335	7,705	x	x	x	05/06/22
FND0091860101	DPB810030	23	335	7,705		x	x	05/04/22
FND0091860102	DPB810030	23	335	7,705		x	x	05/04/22
FND0091860103	DPB810030	23	335	7,705		x	x	05/04/22
FND0091860104	DPB810030	23	335	7,705		x	x	05/04/22
FND0091860105	DPB810030	23	335	7,705		x	x	05/04/22
FND0091860106	DPB810030	23	335	7,705		x	x	05/04/22
FND0091860107	DPB810030	23	335	7,705		x	x	05/04/22
FND0091860108	DPB810030	23	335	7,705		x	x	05/04/22
FND0091860109	DPB810030	23	335	7,705		x	x	05/04/22
FND0091860110	DPB810030	23	335	7,705		x	x	05/04/22
FND0091860111	DPB810030	23	335	7,705		x	x	05/04/22
FND0091860113	DPB810030	23	335	7,705		x	x	05/04/22
FND0091860114	DPB810030	23	335	7,705		x	x	05/06/22
FND0091860115	DPB810030	23	335	7,705		x	x	05/06/22
FND0091860116	DPB810030	23	335	7,705		x	x	05/06/22
FND0091860117	DPB810030	23	335	7,705		x	x	05/06/22
FND0091860118	DPB810030	23	335	7,705		x	x	05/06/22
FND0091860119	DPB810030	23	335	7,705		x	x	05/06/22
FND0091860120	DPB810030	23	335	7,705	x	x	x	05/06/22
FND0091860121	DPB810030	23	335	7,705		x	x	05/06/22
FND0091860122	DPB810030	23	335	7,705		x	x	05/06/22
FND0091860123	DPB810030	23	335	7,705		x	x	05/06/22
FND0091860124	DPB810030	23	335	7,705		x	x	05/06/22
FND0091860125	DPB810030	23	335	7,705		x	x	05/06/22
FND0091860126	DPB810030	23	335	7,705		x	x	05/05/22
FND0091860127	DPB810030	23	335	7,705		x	x	05/05/22
FND0091860128	DPB810030	23	335	7,705		x	x	05/05/22
FND0091860129	DPB810030	23	335	7,705		x	x	05/05/22
FND0091860130	DPB810030	23	335	7,705		x	x	05/05/22
FND0091860131	DPB810030	23	335	7,705		x	x	05/05/22
FND0091860132	DPB810030	23	335	7,705		x	x	05/05/22
FND0091860133	DPB810030	23	335	7,705		x	x	05/05/22
FND0091860134	DPB810030	23	335	7,705		x	x	05/05/22
FND0091860135	DPB810030	23	335	7,705		x	x	05/05/22
FND0091860136	DPB810030	23	335	7,705		x	x	05/05/22

VLF 2 Phase 3

Stage A.1 Record of Construction

100-mil LLDPE Geomembrane Site Inventory Control

Roll Number	Resin Lot Number	Width (ft)	Length (ft)	Area (sf)	Conformance Test	Agru QC Certification	Resin Certification	Site Delivery Date
FND0091860137	DPB810030	23	335	7,705		x	x	05/05/22
FND0091860138	DPB810030	23	335	7,705		x	x	04/19/22
FNB0103590002	DPF811350	23	335	7,705	x	x	x	09/30/22
FNB0103590003	DPF811350	23	335	7,705		x	x	09/30/22
FNB0103590004	DPF811350	23	335	7,705		x	x	09/30/22
FNB0103590005	DPF811350	23	335	7,705		x	x	09/30/22
FNB0103590006	DPF811350	23	335	7,705		x	x	09/30/22
FNB0103590007	DPF811350	23	335	7,705		x	x	09/28/22
FNB0103590008	DPF811350	23	335	7,705		x	x	09/28/22
FNB0103590009	DPF811350	23	335	7,705		x	x	09/30/22
FNB0103590010	DPF811350	23	335	7,705		x	x	09/28/22
FNB0103590011	DPF811350	23	335	7,705		x	x	09/30/22
FNB0103590012	DPF811350	23	335	7,705		x	x	09/28/22
FNB0103590013	DPF811350	23	335	7,705		x	x	09/28/22
FNB0103590014	DPF811350	23	335	7,705		x	x	09/30/22
FNB0103590015	DPF811350	23	335	7,705		x	x	09/28/22
FNB0103590016	DPF811350	23	335	7,705		x	x	09/28/22
FNB0103590017	DPF811350	23	335	7,705		x	x	09/28/22
FNB0103590018	DPF811350	23	335	7,705		x	x	09/28/22
FNB0103590019	DPF811350	23	335	7,705		x	x	09/28/22
FNB0103590020	DPF811350	23	335	7,705		x	x	09/28/22
FNB0103590021	DPF811350	23	335	7,705	x	x	x	09/28/22
FND0105560002	DPH810650	23	335	7,705	x	x	x	10/11/22
FND0105560003	DPH810650	23	335	7,705		x	x	10/11/22
FND0105560004	DPH810650	23	335	7,705		x	x	10/11/22
FND0105560005	DPH810650	23	335	7,705		x	x	10/11/22
FND0105560006	DPH810650	23	335	7,705		x	x	10/10/22
FND0105560007	DPH810650	23	335	7,705		x	x	10/10/22
FND0105560008	DPH810650	23	335	7,705		x	x	10/10/22
FND0105560009	DPH810650	23	335	7,705		x	x	10/10/22
FND0105560010	DPH810650	23	335	7,705		x	x	10/10/22
FND0105560011	DPH810650	23	335	7,705		x	x	10/10/22
FND0105560012	DPH810650	23	335	7,705		x	x	10/10/22
FND0105560013	DPH810650	23	335	7,705		x	x	10/10/22
FND0105560014	DPH810650	23	335	7,705		x	x	10/10/22
FND0105560015	DPH810650	23	335	7,705		x	x	10/10/22
FND0105560016	DPH810650	23	335	7,705		x	x	10/10/22
FND0105560017	DPH810650	23	335	7,705		x	x	10/10/22



APPENDIX H.3 – 100-MIL LLDPE GEOMEMBRANE ROLL QC CERTIFICATES



Geomembrane Quality Certification

Customer: Newmont Mining
Project:
Destination:
Report Date: 30-Mar-2022 10:50 AM

S.O.# SO00013688
Item Number: FG-LDMSDS100BBBEG
Liner Type: LLDPE DS MicroSpike 100mil Black GM17
Roll Count: 133

#	Roll Number	Prod. Date	Width (ft)	Length (ft)	Area (sqft)	Weight (lb)	Resin Lot#	ASTM D5994		ASTM D7466		ASTM D8117	ASTM D792	ASTM D1248	ASTM D4218	ASTM D5596	ASTM D6693			ASTM D1004			ASTM D4833
								Thickness-Avg	Thickness-Min	Asperity (top)	Asperity (bottom)	OIT	Density	Melt Flow	Carbon Content	Category 1 Disp.	Tensile Break Str (MD)	Break Elong (MD)	Tensile Break Str (TD)	Break Elong (TD)	Tear Strength (MD)	Tear Strength (TD)	Puncture Resistance
								mil	mil	mil	mil	minut	g/cc	g/10	%	Categ	ppi	%	ppi	%	lb	lb	lb
1	FND0091860004	03/16/22	23	335	7705	3900	DNM810400	102	92	30	21	196	0.933	0.33	2.4	10	336	576	362	657	90	84	186
2	FND0091860005	03/16/22	23	335	7705	3914	DNM810400	100	95	27	21	196	0.933	0.33	2.4	10	336	576	362	657	90	84	186
3	FND0091860006	03/16/22	23	335	7705	3926	DNM810400	97	94	28	27	196	0.933	0.33	2.4	10	336	576	362	657	90	84	186
4	FND0091860007	03/16/22	23	335	7705	3922	DNM810400	100	96	26	27	196	0.933	0.33	2.4	10	336	576	362	657	90	84	186
5	FND0091860008	03/16/22	23	335	7705	3926	DNM810400	99	97	26	28	196	0.933	0.33	2.4	10	336	576	362	657	90	84	186
6	FND0091860009	03/16/22	23	335	7705	3922	DNM810400	99	95	26	28	196	0.933	0.33	2.9	10	330	565	348	627	90	84	186
7	FND0091860010	03/16/22	23	335	7705	3940	DNM810400	100	94	26	26	196	0.933	0.33	2.9	10	330	565	348	627	90	84	186
8	FND0091860011	03/16/22	23	335	7705	3958	DNM810400	98	94	26	28	196	0.933	0.33	2.9	10	330	565	348	627	90	84	186
9	FND0091860012	03/16/22	23	335	7705	3928	DNM810400	99	93	26	25	196	0.933	0.33	2.3	10	330	565	348	627	90	84	186
10	FND0091860013	03/16/22	23	335	7705	3926	DNM810400	100	97	26	27	196	0.933	0.33	2.9	10	330	565	348	627	90	84	186
11	FND0091860014	03/16/22	23	335	7705	3928	DNM810400	98	93	22	27	196	0.936	0.33	2.5	10	328	576	354	654	95	112	188
12	FND0091860015	03/16/22	23	335	7705	3924	DNM810400	99	89	20	23	196	0.936	0.33	2.5	10	328	576	354	654	95	112	188
13	FND0091860016	03/16/22	23	335	7705	3922	DNM810400	99	94	29	25	196	0.936	0.33	2.5	10	328	576	354	654	95	112	188
14	FND0091860017	03/17/22	23	335	7705	3918	DNM810400	99	96	24	24	196	0.936	0.33	2.5	10	328	576	354	654	95	112	188
15	FND0091860018	03/17/22	23	335	7705	3924	DNM810400	99	95	34	24	196	0.936	0.33	2.5	10	328	576	354	654	95	112	188
16	FND0091860019	03/17/22	23	335	7705	3926	DNM810400	99	93	33	21	196	0.936	0.33	2.6	10	332	574	348	639	95	112	188
17	FND0091860020	03/17/22	23	335	7705	3922	DNM810400	101	96	33	24	196	0.936	0.33	2.6	10	332	574	348	639	95	112	188
18	FND0091860021	03/17/22	23	335	7705	3922	DNM810400	96	93	24	25	196	0.936	0.33	2.6	10	332	574	348	639	95	112	188
19	FND0091860022	03/17/22	23	335	7705	3920	DNM810400	98	95	23	24	196	0.936	0.33	2.5	10	332	574	348	639	95	112	188
20	FND0091860023	03/17/22	23	335	7705	3906	DNM810400	97	95	23	26	196	0.936	0.33	2.6	10	332	574	348	639	95	112	188
21	FND0091860024	03/17/22	23	335	7705	3926	DNM810400	98	96	24	27	196	0.933	0.33	2.5	10	327	579	334	621	85	78	185
22	FND0091860025	03/17/22	23	335	7705	3926	DNM810400	98	94	23	26	196	0.933	0.33	2.5	10	327	579	334	621	85	78	185
23	FND0091860026	03/17/22	23	335	7705	3944	DNM810400	99	93	24	22	196	0.933	0.33	2.5	10	327	579	334	621	85	78	185
24	FND0091860027	03/17/22	23	335	7705	3928	DNM810400	100	95	24	23	196	0.933	0.33	2.3	10	327	579	334	621	85	78	185
25	FND0091860028	03/17/22	23	335	7705	3926	DNM810400	97	93	24	23	196	0.933	0.33	2.3	10	327	579	334	621	85	78	185
26	FND0091860029	03/17/22	23	335	7705	3932	DNM810400	101	95	22	25	196	0.933	0.33	2.5	10	338	585	372	640	85	78	185
27	FND0091860030	03/17/22	23	335	7705	3930	DNM810400	97	94	22	25	196	0.933	0.33	2.5	10	338	585	372	640	85	78	185
28	FND0091860031	03/17/22	23	335	7705	3930	DNM810400	100	97	22	25	196	0.933	0.33	2.5	10	338	585	372	640	85	78	185
29	FND0091860032	03/18/22	23	335	7705	3840	DNM810400	98	97	22	27	196	0.933	0.33	2.6	10	338	585	372	640	85	78	185
30	FND0091860033	03/18/22	23	335	7705	3934	DNM810400	98	93	23	27	196	0.933	0.33	2.6	10	338	585	372	640	85	78	185
31	FND0091860034	03/18/22	23	335	7705	3928	DNM810400	100	98	24	25	196	0.933	0.33	2.5	10	345	574	375	651	87	86	194
32	FND0091860035	03/18/22	23	335	7705	3932	DNM810400	100	98	23	27	196	0.933	0.33	2.5	10	345	574	375	651	87	86	194

#	Roll Number	Prod. Date	Width (ft)	Length (ft)	Area (sqft)	Weight (lb)	Resin Lot#	ASTM D5994		ASTM D7466		ASTM D8117	ASTM D792	ASTM D1248	ASTM D4218	ASTM D5596	ASTM D6693			ASTM D1004			ASTM D4833
								Thickness-Avg	Thickness-Min	Asperity (top)	Asperity (bottom)	OIT	Density	Melt Flow	Carbon Content	Category 1 Disp.	Tensile Break Str (MD)	Break Elong (MD)	Tensile Break Str (TD)	Break Elong (TD)	Tear Strength (MD)	Tear Strength (TD)	Puncture Resistance
								mil	mil	mil	mil												
33	FND0091860036	03/18/22	23	335	7705	3930	DNM810400	97	85	23	24	196	0.933	0.33	2.5	10	345	574	375	651	87	86	194
34	FND0091860037	03/18/22	23	335	7705	3930	DNM810400	97	92	24	24	196	0.933	0.33	2.5	10	345	574	375	651	87	86	194
35	FND0091860038	03/18/22	23	335	7705	3930	DNM810400	99	94	24	24	196	0.933	0.33	2.5	10	345	574	375	651	87	86	194
36	FND0091860039	03/18/22	23	335	7705	3924	DNM810400	97	93	24	25	196	0.933	0.33	2.4	10	300	779	360	648	87	86	194
37	FND0091860040	03/18/22	23	335	7705	3920	DNM810400	98	94	24	25	196	0.933	0.33	2.4	10	300	779	360	648	87	86	194
38	FND0091860041	03/18/22	23	335	7705	3922	DNM810400	97	93	24	25	196	0.933	0.33	2.4	10	300	779	360	648	87	86	194
39	FND0091860042	03/18/22	23	335	7705	3894	DNM810400	98	95	24	25	196	0.933	0.33	2.3	10	300	779	360	648	87	86	194
40	FND0091860043	03/18/22	23	335	7705	3920	DNM810400	99	97	24	22	196	0.933	0.33	2.3	10	300	779	360	648	87	86	194
41	FND0091860044	03/18/22	23	335	7705	3918	DNM810400	99	95	23	26	177	0.934	0.21	2.7	10	351	585	363	638	88	82	188
42	FND0091860045	03/18/22	23	335	7705	3922	DNM810400	97	93	24	33	177	0.934	0.21	2.7	10	351	585	363	638	88	82	188
43	FND0091860046	03/18/22	23	335	7705	3918	DNM810400	100	99	32	32	177	0.934	0.21	2.7	10	351	585	363	638	88	82	188
44	FND0091860047	03/18/22	23	335	7705	3920	DNM810400	98	95	30	32	177	0.934	0.21	2.5	10	351	585	363	638	88	82	188
45	FND0091860048	03/19/22	23	335	7705	3920	DNM810400	99	94	31	30	177	0.934	0.21	2.5	10	351	585	363	638	88	82	188
46	FND0091860049	03/19/22	23	335	7705	3924	DNM810400	96	92	29	30	196	0.939	0.33	2.3	10	335	573	343	634	88	82	188
47	FND0091860050	03/19/22	23	335	7705	3922	DNM810400	96	92	30	29	196	0.934	0.33	2.3	10	335	573	343	634	88	82	188
48	FND0091860051	03/19/22	23	335	7705	3914	DNM810400	97	95	32	32	196	0.934	0.33	2.3	10	335	573	343	634	88	82	188
49	FND0091860052	03/19/22	23	335	7705	3920	DNM810400	101	95	29	31	196	0.934	0.33	2.4	10	335	573	343	634	88	82	188
50	FND0091860053	03/19/22	23	335	7705	3918	DNM810400	99	97	28	32	196	0.934	0.33	2.3	10	335	573	343	634	88	82	188
51	FND0091860054	03/19/22	23	335	7705	3918	DNM810400	100	95	23	28	196	0.933	0.33	2.4	10	328	573	340	638	81	75	183
52	FND0091860055	03/19/22	23	335	7705	3912	DNM810400	98	96	31	32	196	0.933	0.33	2.4	10	328	573	340	638	81	75	183
53	FND0091860056	03/19/22	23	335	7705	3918	DNM810400	99	96	32	32	196	0.933	0.33	2.4	10	328	573	340	638	81	75	183
54	FND0091860057	03/19/22	23	335	7705	3922	DNM810400	99	96	30	32	196	0.933	0.33	2.5	10	328	573	340	638	81	75	183
55	FND0091860058	03/19/22	23	335	7705	3914	DNM810400	99	96	29	41	196	0.933	0.33	2.4	10	328	573	340	638	81	75	183
56	FND0091860059	03/19/22	23	335	7705	3916	DNM810400	101	97	28	32	196	0.933	0.33	2.5	10	328	573	344	643	81	75	183
57	FND0091860060	03/19/22	23	335	7705	3918	DNM810400	96	94	23	27	196	0.933	0.33	2.5	10	328	573	344	643	81	75	183
58	FND0091860061	03/19/22	23	335	7705	3894	DNM810400	100	95	24	24	196	0.933	0.33	2.5	10	328	573	344	643	81	75	183
59	FND0091860062	03/19/22	23	335	7705	3916	DNM810400	97	92	22	28	196	0.933	0.33	2.6	10	328	573	344	643	81	75	183
60	FND0091860063	03/20/22	23	335	7705	3920	DNM810400	99	94	23	27	196	0.933	0.33	2.6	10	328	573	344	643	81	75	183
61	FND0091860064	03/20/22	23	335	7705	3918	DNM810400	98	94	24	25	196	0.932	0.33	2.4	10	355	574	373	651	89	95	186
62	FND0091860065	03/20/22	23	335	7705	3922	DNM810400	98	94	21	25	196	0.932	0.33	2.4	10	355	574	373	651	89	95	186
63	FND0091860066	03/20/22	23	335	7705	3920	DNM810400	98	93	22	25	196	0.932	0.33	2.4	10	355	574	373	651	89	95	186
64	FND0091860067	03/20/22	23	335	7705	3924	DNM810400	99	94	25	25	196	0.932	0.33	2.4	10	355	574	373	651	89	95	186
65	FND0091860068	03/20/22	23	335	7705	3920	DNM810400	98	94	25	30	196	0.932	0.33	2.4	10	355	574	373	651	89	95	186
66	FND0091860069	03/20/22	23	335	7705	3916	DNM810400	98	95	25	29	196	0.932	0.33	2.4	10	329	578	359	659	89	95	186
67	FND0091860070	03/20/22	23	335	7705	3916	DNM810400	98	96	24	25	196	0.932	0.33	2.4	10	329	578	359	659	89	95	186
68	FND0091860071	03/20/22	23	335	7705	3912	DNM810400	97	93	25	28	196	0.932	0.33	2.4	10	329	578	359	659	89	95	186
69	FND0091860072	03/20/22	23	335	7705	3914	DNM810400	99	97	25	26	196	0.932	0.33	2.5	10	329	578	359	659	89	95	186
70	FND0091860073	03/20/22	23	335	7705	3944	DNM810400	98	95	25	28	196	0.932	0.33	2.4	10	329	578	359	659	89	95	186
71	FND0091860074	03/20/22	23	335	7705	3912	DNM810400	99	92	24	27	196	0.933	0.33	2.5	10	319	571	332	639	86	78	187
72	FND0091860075	03/20/22	23	335	7705	3910	DNM810400	98	94	24	28	196	0.933	0.33	2.5	10	319	571	332	639	86	78	187
73	FND0091860076	03/20/22	23	335	7705	3922	DNM810400	98	93	23	25	196	0.933	0.33	2.5	10	319	571	332	639	86	78	187
74	FND0091860077	03/20/22	23	335	7705	3924	DNM810400	100	95	22	24	196	0.933	0.33	2.5	10	319	571	332	639	86	78	187

#	Roll Number	Prod. Date	Width (ft)	Length (ft)	Area (sqft)	Weight (lb)	Resin Lot#	ASTM D5994		ASTM D7466		ASTM D8117	ASTM D792	ASTM D1248	ASTM D4218	ASTM D5596	ASTM D6693			ASTM D1004			ASTM D4833
								Thickness-Avg	Thickness-Min	Asperity (top)	Asperity (bottom)	OIT	Density	Melt Flow	Carbon Content	Category 1 Disp.	Tensile Break Str (MD)	Break Elong (MD)	Tensile Break Str (TD)	Break Elong (TD)	Tear Strength (MD)	Tear Strength (TD)	Puncture Resistance
								mil	mil	mil	mil												
75	FND0091860078	03/21/22	23	335	7705	3920	DNM810400	97	94	23	25	196	0.933	0.33	2.5	10	319	571	332	639	86	78	187
76	FND0091860079	03/21/22	23	335	7705	3926	DPB810030	99	96	23	24	193	0.937	0.34	2.4	10	347	584	369	659	86	78	187
77	FND0091860080	03/21/22	23	335	7705	3906	DPB810030	97	93	24	27	193	0.937	0.34	2.4	10	347	584	369	659	86	78	187
78	FND0091860081	03/21/22	23	335	7705	3930	DPB810030	99	93	25	26	193	0.937	0.34	2.4	10	347	584	369	659	86	78	187
79	FND0091860082	03/21/22	23	335	7705	3930	DPB810030	98	94	23	27	193	0.937	0.34	2.4	10	347	584	369	659	86	78	187
80	FND0091860083	03/22/22	23	335	7705	3926	DPB810030	100	97	23	26	193	0.937	0.34	2.4	10	347	584	369	659	86	78	187
81	FND0091860085	03/22/22	23	335	7705	3952	DPB810030	98	94	23	24	193	0.935	0.34	2.6	10	338	565	350	631	85	82	191
82	FND0091860086	03/22/22	23	335	7705	3912	DPB810030	100	94	22	28	193	0.935	0.34	2.6	10	338	565	350	631	85	82	191
83	FND0091860087	03/22/22	23	335	7705	3916	DPB810030	97	92	22	25	193	0.935	0.34	2.6	10	338	565	350	631	85	82	191
84	FND0091860088	03/22/22	23	335	7705	3916	DPB810030	97	91	25	24	193	0.935	0.34	2.4	10	338	565	350	631	85	82	191
85	FND0091860089	03/23/22	23	335	7705	3922	DPB810030	97	92	28	23	193	0.935	0.34	2.4	10	338	565	350	631	85	82	191
86	FND0091860090	03/23/22	23	335	7705	3920	DPB810030	98	94	32	25	193	0.935	0.34	2.4	10	348	582	364	654	85	82	191
87	FND0091860091	03/23/22	23	335	7705	3914	DPB810030	98	93	23	27	193	0.935	0.34	2.4	10	348	582	364	654	85	82	191
88	FND0091860092	03/23/22	23	335	7705	3916	DPB810030	98	93	24	26	193	0.935	0.34	2.4	10	348	582	364	654	85	82	191
89	FND0091860093	03/23/22	23	335	7705	3914	DPB810030	99	96	24	26	193	0.935	0.34	2.5	10	348	582	364	654	85	82	191
90	FND0091860094	03/23/22	23	335	7705	3920	DPB810030	98	93	24	22	193	0.935	0.34	2.5	10	348	582	364	654	85	82	191
91	FND0091860095	03/23/22	23	335	7705	3906	DPB810030	99	94	25	25	193	0.935	0.34	2.5	10	340	588	366	646	91	86	189
92	FND0091860096	03/23/22	23	335	7705	3898	DPB810030	96	94	25	27	193	0.935	0.34	2.5	10	340	588	366	646	91	86	189
93	FND0091860097	03/23/22	23	335	7705	3912	DPB810030	99	92	25	23	193	0.935	0.34	2.5	10	340	588	366	646	91	86	189
94	FND0091860098	03/23/22	23	335	7705	3890	DPB810030	96	92	25	25	193	0.935	0.34	2.7	10	340	588	366	646	91	86	189
95	FND0091860099	03/23/22	23	335	7705	3908	DPB810030	98	95	25	25	193	0.935	0.34	2.7	10	340	588	366	646	91	86	189
96	FND0091860100	03/23/22	23	335	7705	3878	DPB810030	97	93	24	27	193	0.935	0.34	2.4	10	346	593	347	629	91	86	189
97	FND0091860101	03/23/22	23	335	7705	3898	DPB810030	98	94	25	23	193	0.935	0.34	2.4	10	346	593	347	629	91	86	189
98	FND0091860102	03/23/22	23	335	7705	3906	DPB810030	99	97	24	26	193	0.935	0.34	2.4	10	346	593	347	629	91	86	189
99	FND0091860103	03/23/22	23	335	7705	3908	DPB810030	98	96	25	24	193	0.935	0.34	2.4	10	346	593	347	629	91	86	189
100	FND0091860104	03/23/22	23	335	7705	3906	DPB810030	99	96	30	23	193	0.935	0.34	2.4	10	346	593	347	629	91	86	189
101	FND0091860105	03/24/22	23	335	7705	3908	DPB810030	98	95	26	26	193	0.936	0.34	2.6	10	336	567	344	621	83	79	183
102	FND0091860106	03/24/22	23	335	7705	3906	DPB810030	100	97	24	27	193	0.936	0.34	2.6	10	336	567	344	621	83	79	183
103	FND0091860107	03/24/22	23	335	7705	3912	DPB810030	97	94	25	27	193	0.936	0.34	2.6	10	336	567	344	621	83	79	183
104	FND0091860108	03/24/22	23	335	7705	3908	DPB810030	99	94	23	26	193	0.936	0.34	2.4	10	336	567	344	621	83	79	183
105	FND0091860109	03/24/22	23	335	7705	3914	DPB810030	99	95	22	26	193	0.936	0.34	2.6	10	336	567	344	621	83	79	183
106	FND0091860110	03/24/22	23	335	7705	3910	DPB810030	99	95	22	25	193	0.936	0.34	2.6	10	357	609	345	648	83	79	183
107	FND0091860111	03/24/22	23	335	7705	3910	DPB810030	99	95	22	27	193	0.936	0.34	2.6	10	357	609	345	648	83	79	183
108	FND0091860113	03/24/22	23	335	7705	3896	DPB810030	101	97	26	28	193	0.936	0.34	2.6	10	357	609	345	648	83	79	183
109	FND0091860114	03/24/22	23	335	7705	3888	DPB810030	97	94	23	27	193	0.936	0.34	2.5	10	357	609	345	648	83	79	183
110	FND0091860115	03/24/22	23	335	7705	3890	DPB810030	100	96	24	26	193	0.936	0.34	2.5	10	357	609	345	648	83	79	183
111	FND0091860116	03/24/22	23	335	7705	3884	DPB810030	99	96	27	27	193	0.937	0.34	2.7	10	349	572	361	644	100	98	190
112	FND0091860117	03/24/22	23	335	7705	3886	DPB810030	96	94	26	27	193	0.937	0.34	2.7	10	349	572	361	644	100	98	190
113	FND0091860118	03/24/22	23	335	7705	3888	DPB810030	98	93	23	27	193	0.937	0.34	2.7	10	349	572	361	644	100	98	190
114	FND0091860119	03/25/22	23	335	7705	3892	DPB810030	96	92	25	26	193	0.937	0.34	2.4	10	349	572	361	644	100	98	190
115	FND0091860120	03/25/22	23	335	7705	3864	DPB810030	98	93	26	29	193	0.937	0.34	2.4	10	349	572	361	644	100	98	190
116	FND0091860121	03/25/22	23	335	7705	3886	DPB810030	97	93	24	28	193	0.937	0.34	2.4	10	350	591	360	649	100	98	190

#	Roll Number	Prod. Date	Width (ft)	Length (ft)	Area (sqft)	Weight (lb)	Resin Lot#	ASTM D5994		ASTM D7466		ASTM D8117	ASTM D792	ASTM D1248	ASTM D4218	ASTM D5596	ASTM D6693			ASTM D1004			ASTM D4833
								Thickness-Avg	Thickness-Min	Asperity (top)	Asperity (bottom)	OIT	Density	Melt Flow	Carbon Content	Category 1 Disp.	Tensile Break Str (MD)	Break Elong (MD)	Tensile Break Str (TD)	Break Elong (TD)	Tear Strength (MD)	Tear Strength (TD)	Puncture Resistance
								mil	mil	mil	mil												
117	FND0091860122	03/25/22	23	335	7705	3900	DPB810030	97	93	26	29	193	0.937	0.34	2.4	10	350	591	360	649	100	98	190
118	FND0091860123	03/25/22	23	335	7705	3892	DPB810030	98	94	27	26	193	0.937	0.34	2.4	10	350	591	360	649	100	98	190
119	FND0091860124	03/25/22	23	335	7705	3896	DPB810030	98	93	28	25	193	0.937	0.34	2.5	10	350	591	360	649	100	98	190
120	FND0091860125	03/25/22	23	335	7705	3888	DPB810030	98	95	29	26	193	0.937	0.34	2.5	10	350	591	360	649	100	98	190
121	FND0091860126	03/25/22	23	335	7705	3884	DPB810030	97	95	34	27	193	0.934	0.34	2.5	10	331	577	349	656	91	84	185
122	FND0091860127	03/25/22	23	335	7705	3878	DPB810030	100	97	28	25	193	0.934	0.34	2.5	10	331	577	349	656	91	84	185
123	FND0091860128	03/25/22	23	335	7705	3888	DPB810030	97	94	31	29	193	0.934	0.34	2.5	10	331	577	349	656	91	84	185
124	FND0091860129	03/25/22	23	335	7705	3898	DPB810030	99	97	27	26	193	0.934	0.34	2.4	10	331	577	349	656	91	84	185
125	FND0091860130	03/25/22	23	335	7705	3890	DPB810030	96	92	25	28	193	0.934	0.34	2.4	10	331	577	349	656	91	84	185
126	FND0091860131	03/25/22	23	335	7705	3900	DPB810030	98	94	25	27	193	0.934	0.34	2.5	10	343	581	361	648	91	84	185
127	FND0091860132	03/25/22	23	335	7705	3896	DPB810030	97	94	28	26	193	0.934	0.34	2.5	10	343	581	361	648	91	84	185
128	FND0091860133	03/25/22	23	335	7705	3900	DPB810030	99	93	25	25	193	0.934	0.34	2.5	10	343	581	361	648	91	84	185
129	FND0091860134	03/26/22	23	335	7705	3898	DPB810030	99	93	26	26	193	0.934	0.34	2.6	10	343	581	361	648	91	84	185
130	FND0091860135	03/26/22	23	335	7705	3900	DPB810030	97	94	26	26	193	0.934	0.34	2.6	10	343	581	361	648	91	84	185
131	FND0091860136	03/26/22	23	335	7705	3902	DPB810030	98	94	25	26	193	0.934	0.34	2.5	10	356	614	365	658	95	102	188
132	FND0091860137	03/26/22	23	335	7705	3902	DPB810030	97	93	34	27	193	0.934	0.34	2.5	10	356	614	365	658	95	102	188
133	FND0091860138	03/26/22	23	335	7705	3898	DPB810030	98	94	28	27	193	0.934	0.34	2.5	10	356	614	365	658	95	102	188

Ryan Steele, Lab Manager

For Questions, Please Contact: Lab Manager, Fernley
 Ryan Steele
 775-835-8282
 Ext 2015



Geomembrane Quality Certification

Customer: Newmont Mining
Project: Cripple Creek
Destination: Cripple Creek, CO
Report Date: 08-Sep-2022 1:34 PM

S.O.# SO00016473
Item Number: FG-LDMSDS100BBBEG
Liner Type: LLDPE DS MicroSpike 100mil Black GM17
Roll Count: 20 (From 1 To 20)

#	Roll Number	Prod. Date	Width (ft)	Length (ft)	Area (sqft)	Weight (lb)	Resin Lot#	ASTM D5994		ASTM D7466		ASTM D8117	ASTM D792	ASTM D1238	ASTM D4218	ASTM D5596	ASTM D6693			ASTM D1004			ASTM D4833
								Thickness-Min	Thickness-Avg	Asperity (top)	Asperity (bottom)	OIT	Density	Melt Flow	Carbon Content	Category 1 Disp.	Tensile Break Str (MD)	Break Elong (MD)	Tensile Break Str (TD)	Break Elong (TD)	Tear Strength (MD)	Tear Strength (TD)	Puncture Resistance
								mil	mil	mil	mil	minut	g/cc	g/10	%	Categ	ppi	%	ppi	%	lb	lb	lb
1	FNB0103590002	09/06/22	23	335	7705	3762	DPF811350	96	98	28	29	187	0.936	0.35	2.4	10	329	579	326	640	74	82	177
2	FNB0103590003	09/06/22	23	335	7705	3810	DPF811350	90	95	29	27	187	0.936	0.35	2.4	10	329	579	326	640	74	82	177
3	FNB0103590004	09/06/22	23	335	7705	3812	DPF811350	93	96	30	28	187	0.936	0.35	2.4	10	329	579	326	640	74	82	177
4	FNB0103590005	09/06/22	23	335	7705	3882	DPF811350	94	97	29	28	187	0.936	0.35	2.5	10	329	579	326	640	74	82	177
5	FNB0103590006	09/06/22	23	335	7705	3894	DPF811350	95	98	30	31	187	0.936	0.35	2.4	10	329	579	326	640	74	82	177
6	FNB0103590007	09/06/22	23	335	7705	3890	DPF811350	94	98	27	35	187	0.936	0.35	2.2	10	332	575	340	635	74	82	177
7	FNB0103590008	09/07/22	23	335	7705	3900	DPF811350	93	98	25	37	187	0.936	0.35	2.2	10	332	575	340	635	74	82	177
8	FNB0103590009	09/07/22	23	335	7705	3900	DPF811350	94	98	25	35	187	0.936	0.35	2.2	10	332	575	340	635	74	82	177
9	FNB0103590010	09/07/22	23	335	7705	3902	DPF811350	94	98	26	38	187	0.936	0.35	2.4	10	332	575	340	635	74	82	177
10	FNB0103590011	09/07/22	23	335	7705	3898	DPF811350	93	98	28	32	187	0.936	0.35	2.4	10	332	575	340	635	74	82	177
11	FNB0103590012	09/07/22	23	335	7705	3896	DPF811350	95	99	26	36	187	0.935	0.35	2.5	10	330	558	345	632	85	85	183
12	FNB0103590013	09/07/22	23	335	7705	3912	DPF811350	96	99	27	32	187	0.935	0.35	2.5	10	330	558	345	632	85	85	183
13	FNB0103590014	09/07/22	23	335	7705	3914	DPF811350	95	99	27	34	187	0.935	0.35	2.5	10	330	558	345	632	85	85	183
14	FNB0103590015	09/07/22	23	335	7705	3916	DPF811350	96	98	29	32	187	0.935	0.35	2.4	10	330	558	345	632	85	85	183
15	FNB0103590016	09/07/22	23	335	7705	3910	DPF811350	96	98	27	30	187	0.935	0.35	2.5	10	330	558	345	632	85	85	183
16	FNB0103590017	09/07/22	23	335	7705	3916	DPF811350	95	100	26	30	187	0.935	0.35	2.4	10	340	584	356	664	85	85	183
17	FNB0103590018	09/07/22	23	335	7705	3912	DPF811350	94	98	28	30	187	0.935	0.35	2.4	10	340	584	356	664	85	85	183
18	FNB0103590019	09/07/22	23	335	7705	3864	DPF811350	94	97	25	34	187	0.935	0.35	2.4	10	340	584	356	664	85	85	183
19	FNB0103590020	09/07/22	23	335	7705	3864	DPF811350	94	98	30	32	187	0.935	0.35	2.5	10	340	584	356	664	85	85	183
20	FNB0103590021	09/07/22	23	335	7705	3852	DPF811350	94	97	30	31	187	0.935	0.35	2.4	10	340	584	356	664	85	85	183

Ryan Steele, Lab Manager

For Questions, Please Contact: Lab Manager, Fernley
 Ryan Steele
 775-835-8282
 Ext 2015



Geomembrane Quality Certification

Customer: Newmont Mining
Project: Cripple Creek
Destination: Cripple Creek, CO
Report Date: 06-Oct-2022 9:09 AM

S.O.# SO00016830
Item Number: FG-LDMSDS100BBBEG
Liner Type: LLDPE DS MicroSpike 100mil Black GM17
Roll Count: 16 (From 1 To 16)

ACCEPTANCE IS FOR GENERAL COMPLIANCE WITH THE CONTRACT DOCUMENTS ONLY. THE CONTRACTOR IS RESPONSIBLE FOR CONFIRMING AND CORRELATING ALL QUANTITIES AND DIMENSIONS; SELECTING FABRICATION PROCESS AND TECHNIQUES FOR CONSTRUCTION; COORDINATING ITS WORK WITH THAT OF ALL OTHER TRADES; AND PERFORMING ITS WORK IN A SAFE AND SATISFACTORY MANNER.

APPROVED

REVISE AND RESUBMIT

APPROVED WITH CHANGES NOTED

REJECTED

DATE: Oct 10, 2022 BY: Nikoliya L. Boyanich

#	Roll Number	Prod. Date	Width (ft)	Length (ft)	Area (sqft)	Weight (lb)	Resin Lot#	ASTM D5994		ASTM D7466		ASTM D8117	ASTM D792	ASTM D1238	ASTM D4218	ASTM D5596	ASTM D6693			ASTM D1004			ASTM D4833
								Thickness-Min	Thickness-Avg	Asperity (top)	Asperity (bottom)	OIT	Density	Melt Flow	Carbon Content	Category 1 Disp.	Tensile Break Str (MD)	Break Elong (MD)	Tensile Break Str (TD)	Break Elong (TD)	Tear Strength (MD)	Tear Strength (TD)	Puncture Resistance
								mil	mil	mil	mil	minut	g/cc	g/10	%	Categ	ppi	%	ppi	%	lb	lb	lb
1	FND0105560002	10/05/22	23	335	7705	3788	DPH810650	92	97	33	26	196	0.935	0.33	2.2	10	293	504	325	631	88	81	181
2	FND0105560003	10/05/22	23	335	7705	3796	DPH810650	90	97	26	27	196	0.935	0.33	2.2	10	293	504	325	631	88	81	181
3	FND0105560004	10/05/22	23	335	7705	3798	DPH810650	92	99	28	24	196	0.935	0.33	2.2	10	293	504	325	631	88	81	181
4	FND0105560005	10/05/22	23	335	7705	3800	DPH810650	92	95	26	25	196	0.935	0.33	2.2	10	293	504	325	631	88	81	181
5	FND0105560006	10/05/22	23	335	7705	3806	DPH810650	91	97	27	26	196	0.935	0.33	2.2	10	293	504	325	631	88	81	181
6	FND0105560007	10/05/22	23	335	7705	3800	DPH810650	91	96	28	26	196	0.935	0.33	2.3	10	325	547	341	641	88	81	181
7	FND0105560008	10/05/22	23	335	7705	3820	DPH810650	92	95	26	27	196	0.935	0.33	2.3	10	325	547	341	641	88	81	181
8	FND0105560009	10/05/22	23	335	7705	3824	DPH810650	96	99	26	25	196	0.935	0.33	2.3	10	325	547	341	641	88	81	181
9	FND0105560010	10/05/22	23	335	7705	3826	DPH810650	95	98	23	27	196	0.935	0.33	2.3	10	325	547	341	641	88	81	181
10	FND0105560011	10/05/22	23	335	7705	3824	DPH810650	93	96	27	25	196	0.935	0.33	2.3	10	325	547	341	641	88	81	181
11	FND0105560012	10/05/22	23	335	7705	3830	DPH810650	95	98	29	24	196	0.932	0.33	2.4	10	317	534	321	627	81	79	183
12	FND0105560013	10/05/22	23	335	7705	3854	DPH810650	93	97	27	26	196	0.932	0.33	2.4	10	317	534	321	627	81	79	183
13	FND0105560014	10/06/22	23	335	7705	3846	DPH810650	92	97	26	24	196	0.932	0.33	2.4	10	317	534	321	627	81	79	183
14	FND0105560015	10/06/22	23	335	7705	3848	DPH810650	96	98	25	28	196	0.932	0.33	2.2	10	317	534	321	627	81	79	183
15	FND0105560016	10/06/22	23	335	7705	3842	DPH810650	91	96	24	27	196	0.932	0.33	2.2	10	317	534	321	627	81	79	183
16	FND0105560017	10/06/22	23	335	7705	3846	DPH810650	93	98	24	25	196	0.932	0.33	2.2	10	336	569	328	633	81	79	183

Ryan Steele, Lab Manager

For Questions, Please Contact: Lab Manager, Fernley
 Ryan Steele
 775-835-8282
 Ext 2015



APPENDIX H.4 – 100-MIL LLDPE GEOMEMBRANE RESIN QC CERTIFICATES



Certificate of Analysis

Shipped To: AGRU AMERICA INC:FERNLEY
2000 EAST NEWLANDS
FERNLEY NV 89408
USA

Recipient: PALMER
Fax:

Delivery #: 80608491
PO #: 19065
Weight: 187900.000 LB
Ship Date: 02/04/2022
Package: BULK
Mode: Hopper Car
Car #: CPCX817372
Seal No: 268336

Product:
MARLEX 7104 POLYETHYLENE in Bulk

Lot Number: DNM810400

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.33	g/10min
HLMI	ASTM D1238	14.30	g/10min
Pellet Count	ST-905	31	pelet/gram
Production date		20211106	
Density	D1505	0.920	g/cm3

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP (CPChem).
However, there is no warranty of any kind, either expressed or implied, applicable to its use, and the user assumes all risk and liability in connection therewith.

AMANDA ROBY
QUALITY ASSURANCE SUPERINTENDENT

For CoA questions contact Leslie Dziamara at +1-832-813-4806



Certificate of Analysis

Shipped To: AGRU AMERICA INC:FERNLEY
2000 EAST NEWLANDS
FERNLEY NV 89408
USA

Recipient: PALMER
Fax:

Delivery #: 80610423
PO #: 19065
Weight: 185500.000 LB
Ship Date: 02/08/2022
Package: BULK
Mode: Hopper Car
Car #: CHVX895034
Seal No: 275645

Product:
MARLEX 7104 POLYETHYLENE in Bulk

Lot Number: DPB810030

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.34	g/10min
HLMI	ASTM D1238	16.10	g/10min
Pellet Count	ST-905	32	pelet/gram
Production date		20220201	
Density	D1505	0.919	g/cm3

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP (CPChem).
However, there is no warranty of any kind, either expressed or implied, applicable to its use, and the user assumes all risk and liability in connection therewith.

AMANDA ROBY
QUALITY ASSURANCE SUPERINTENDENT

For CoA questions contact Leslie Dziamara at +1-832-813-4806



Vergil H. Rhodes, PE, CPlasT - Tech Svc & App Dev Engineer, Geomembranes
Highways 60 & 123, Bartlesville Research and Technology Center, Room 103 PTC
Bartlesville, OK 74003
■ 539-529-4279 ■ rhodevh@cpchem.com ■ Fax: 918-977-7599 ■ www.cpchem.com

November 12, 2021

Filename: Agru Oven and QUV Exposure for HP-OIT Testing_2021_111221.pdf

Nathan Ivy - Corporate Quality Control/Technical Manager
Agru America, Inc.
800 Rockmead #122
Kingwood, TX 77339
281-358-4741

Dear Mr. Ivy:

Please recall your request for testing of oven-exposed and UV-exposed geomembrane samples produced primarily from Marlex® 7104 LLDPE and Marlex® K307 MDPE. Agru blended other components with each of these polyethylenes to produce the geomembrane samples for testing. Geomembrane samples have been received from Agru, and test specimens were taken from the smooth areas of the samples. Test results are reported on the following two pages. The samples were tested for HP-OIT in their as-received condition and were also tested after oven and UV exposures of 90 days and 1600 hours of irradiance, respectively, in accordance with GRI-GM13 and GRI-GM17 requirements.

The following geomembrane sheet samples were received from Agru in July 2021 and were reported to be primarily composed of each of the Chevron Phillips Chemical Company grades in the description below:

- Marlex® K307 Lot # PND821550, Agru Roll # GTC0078250016, black sheet, smooth, nominal 0.057" thick.
- Marlex® 7104 Lot # DNE810980, Agru Roll # GTA0077190117, black sheet, textured, nominal 0.055" thick.

The exposure and testing conditions along with the corresponding test results are tabulated on the next two pages. GM-13 and GM-17 require a minimum % HP-OIT retention after a 90-day oven exposure and after a 1600-hour UV irradiance exposure. These test results indicate the GM-13 and GM-17 minimum % HP-OIT retentions were exceeded by the Agru-supplied K307 and 7104 sheet samples, respectively.

If you have any questions, please feel free to contact me (contact information given above).

Sincerely,

Vergil Rhodes
Polyethylene Technical Service and Applications Development, Geomembrane

NOTICES

Technical Information - By using any Technical Information contained herein, Recipient agrees that said Technical Information is given by CPChem for convenience only, without any warranty or guarantee of any kind, and is accepted and used at your sole risk. Recipients are encouraged to verify independently any such information to their reasonable satisfaction. As used in this paragraph, "Technical Information" includes any technical advice, recommendations, testing, or analysis, including, without limitation, information as it may relate to the selection of a product for a specific use and application.

The following oven aging and UV exposure test methods were conducted in accordance with the GRI-GM13 (HDPE) and GRI-GM17 (LLDPE) requirements:

Test Name	Exposure Conditions	Test Method
Oven Aging	90 days in an oven at 85 °C	ASTM D5721
UV Exposure	1600 UV irradiance hours. Cycle: 20 hours UVA-340 at 75 °C followed by 4 hours dark with condensation at 60 °C. Irradiance was 0.78 W/m ² at wavelength 340 nm. Note: This implies a total UV chamber residence time of 1920 hours, e.g., 1600 hours of irradiance and 320 hours of dark/condensation.	ASTM D7238
HP-OIT	150 °C in an oxygen atmosphere at 500 psi	ASTM D5885

Oven Aging Results:

Sample	Initial HP-OIT (min)	HP-OIT after 90 days of oven aging. (min)	% HP-OIT Retained after 90 days of oven aging.	GRI-GM13 and GRI-GM17 minimum % HP-OIT requirements after 90 days of oven aging.
K307 Lot # PND821550, Agru Roll # GTC0078250016, black sheet, smooth, nominal 0.057" thick	1313	1174	89.4%	GRI-GM13: % HP-OIT: 80% minimum
7104 Lot # DNE810980, Agru Roll # GTA0077190117, black sheet, textured, nominal 0.055" thick	973	802	82.4%	GRI-GM17: % HP-OIT: 60% minimum

Continued on Page 3 - - -

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UV Aging Results:

Sample	Initial HP-OIT (min)	HP-OIT after 1600 hrs of UV exposure. (min)	% HP-OIT Retained after 1600 hrs of UV exposure.	GRI-GM13 and GRI-GM17 minimum % HP-OIT requirements after 1600 hours of UV exposure.
K307 Lot # PND821550, Agru Roll # GTC0078250016, black sheet, smooth, nominal 0.057" thick	1313	1053	80.2%	GRI-GM13: % HP-OIT: 50% minimum
7104 Lot # DNE810980, Agru Roll # GTA0077190117, black sheet, textured, nominal 0.055" thick	973	768	78.9%	GRI-GM17: % HP-OIT: 35% minimum

Notes:

- 1600 hours of UV exposure in accordance with ASTM D7238 implies a total UV chamber residence time of 1920 hours, e.g., 1600 hours of irradiance and 320 hours of darkness with condensation.
- Sheet samples were aged with the shiny side of the sheet facing the UV bulbs.

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February 20, 2014

Mail To:

Grant Palmer
Agru
500 Garrison Road
Georgetown, SC 29440

email: gp@agruamerica.com

Bill To:

<= Same (P O# : 6390-14)

Dear Mr. Palmer:

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

TRI Job Reference Number: E2386-71-06

Material(s) Tested: One Agru 100 mil. Single Sided Microspike LLDPE Geomembrane

Test(s) Requested: 2% Secant (ASTM D5323 via ASTM D638, GM17)
Multi-axial Tensile (ASTM D 5617)

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

Sincerely,

Mansukh Patel
Laboratory Manager
Geosynthetic Services Division
www.GeosyntheticTesting.com



GEOMEMBRANE TEST RESULTS

TRI Client: Agru

Material: Agru 100 mil Single Sided Microspike LLDPE Geomembrane

Sample Identification: F14B0611008

Chevron 7104 LLDPE Resin

Resin Lot# CDN810200

TRI Log #: E2386-71-06

PARAMETER											TEST REPLICATE NUMBER											MEAN	STD. DEV.
											1	2	3	4	5	6	7	8	9	10			
2% Secant Modulus (ASTM D5323 via ASTM D638, GM17)																							
MD 2% Secant Modulus (psi)		33940	35787	34423	37838	36088								35615	1535								
MD 2% Secant Modulus (ppi)		3632	3593	3704	3950	3887								3753	158								
TD 2% Secant Modulus (psi)		41105	38515	40456	38535	38438								39410	1273								
TD 2% Secant Modulus (ppi)		4472	4117	4284	3981	3936								4158	222								
Multi-axial Tensile (ASTM D 5617)																							
Test Method A: Centerpoint Deflection Versus Pressure																							
Thickness (mils)		107	105	105											106	1							
Maximum Stress (psi)		1771	1714	1662											1716	55							
% Elongation @ Rupture (%)		94	104	97											98	5							
Failure Description		MDT	MDT	MDT																			
		N-EF	N-EF	N-EF																			
MDT	A tear in the machine direction.																						
H	Circular or elliptical hole in the specimen.																						
H-CAT	Circular or elliptical hole in an area where the material has significantly necked down or thinned. The large thinned area resembles a pupil of a cat eye.																						
N-EF	No edge failure																						
MD Machine Direction		TD Transverse Direction																					



Certificate of Analysis

Shipped To: AGRU AMERICA INC:FERNLEY
2000 Newlands Dr E
FERNLEY NV 89408-8944
USA

Recipient: PALMER
Fax:

Delivery #: 80699959
PO #: 19423
Weight: 188350.000 LB
Ship Date: 06/22/2022
Package: BULK
Mode: Hopper Car
Car #: CHVX889338
Seal No: 298633

Product:
MARLEX 7104 POLYETHYLENE in Bulk

Lot Number: DPF811350

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.35	g/10min
HLMI	ASTM D1238	14.70	g/10min
Pellet Count	ST-905	35	pelet/gram
Production date		20220620	
Density	D1505	0.919	g/cm3

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP (CPChem).
However, there is no warranty of any kind, either expressed or implied, applicable to its use, and the user assumes all risk and liability in connection therewith.

AMANDA ROBY
QUALITY ASSURANCE SUPERINTENDENT

For CoA questions contact Leslie Dziamara at +1-832-813-4806



Vergil H. Rhodes, PE, CPlasT - Tech Svc & App Dev Engineer, Geomembranes
Highways 60 & 123, Bartlesville Research and Technology Center, Room 103 PTC
Bartlesville, OK 74003
■ 539-529-4279 ■ rhodevh@cpchem.com ■ Fax: 918-977-7599 ■ www.cpchem.com

November 12, 2021

Filename: Agru Oven and QUV Exposure for HP-OIT Testing_2021_111221.pdf

Nathan Ivy - Corporate Quality Control/Technical Manager
Agru America, Inc.
800 Rockmead #122
Kingwood, TX 77339
281-358-4741

Dear Mr. Ivy:

Please recall your request for testing of oven-exposed and UV-exposed geomembrane samples produced primarily from Marlex® 7104 LLDPE and Marlex® K307 MDPE. Agru blended other components with each of these polyethylenes to produce the geomembrane samples for testing. Geomembrane samples have been received from Agru, and test specimens were taken from the smooth areas of the samples. Test results are reported on the following two pages. The samples were tested for HP-OIT in their as-received condition and were also tested after oven and UV exposures of 90 days and 1600 hours of irradiance, respectively, in accordance with GRI-GM13 and GRI-GM17 requirements.

The following geomembrane sheet samples were received from Agru in July 2021 and were reported to be primarily composed of each of the Chevron Phillips Chemical Company grades in the description below:

- Marlex® K307 Lot # PND821550, Agru Roll # GTC0078250016, black sheet, smooth, nominal 0.057" thick.
- Marlex® 7104 Lot # DNE810980, Agru Roll # GTA0077190117, black sheet, textured, nominal 0.055" thick.

The exposure and testing conditions along with the corresponding test results are tabulated on the next two pages. GM-13 and GM-17 require a minimum % HP-OIT retention after a 90-day oven exposure and after a 1600-hour UV irradiance exposure. These test results indicate the GM-13 and GM-17 minimum % HP-OIT retentions were exceeded by the Agru-supplied K307 and 7104 sheet samples, respectively.

If you have any questions, please feel free to contact me (contact information given above).

Sincerely,

Vergil Rhodes
Polyethylene Technical Service and Applications Development, Geomembrane

NOTICES

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The following oven aging and UV exposure test methods were conducted in accordance with the GRI-GM13 (HDPE) and GRI-GM17 (LLDPE) requirements:

Test Name	Exposure Conditions	Test Method
Oven Aging	90 days in an oven at 85 °C	ASTM D5721
UV Exposure	1600 UV irradiance hours. Cycle: 20 hours UVA-340 at 75 °C followed by 4 hours dark with condensation at 60 °C. Irradiance was 0.78 W/m ² at wavelength 340 nm. Note: This implies a total UV chamber residence time of 1920 hours, e.g., 1600 hours of irradiance and 320 hours of dark/condensation.	ASTM D7238
HP-OIT	150 °C in an oxygen atmosphere at 500 psi	ASTM D5885

Oven Aging Results:

Sample	Initial HP-OIT (min)	HP-OIT after 90 days of oven aging. (min)	% HP-OIT Retained after 90 days of oven aging.	GRI-GM13 and GRI-GM17 minimum % HP-OIT requirements after 90 days of oven aging.
K307 Lot # PND821550, Agru Roll # GTC0078250016, black sheet, smooth, nominal 0.057" thick	1313	1174	89.4%	GRI-GM13: % HP-OIT: 80% minimum
7104 Lot # DNE810980, Agru Roll # GTA0077190117, black sheet, textured, nominal 0.055" thick	973	802	82.4%	GRI-GM17: % HP-OIT: 60% minimum

Continued on Page 3 - - -

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UV Aging Results:

Sample	Initial HP-OIT (min)	HP-OIT after 1600 hrs of UV exposure. (min)	% HP-OIT Retained after 1600 hrs of UV exposure.	GRI-GM13 and GRI-GM17 minimum % HP-OIT requirements after 1600 hours of UV exposure.
K307 Lot # PND821550, Agru Roll # GTC0078250016, black sheet, smooth, nominal 0.057" thick	1313	1053	80.2%	GRI-GM13: % HP-OIT: 50% minimum
7104 Lot # DNE810980, Agru Roll # GTA0077190117, black sheet, textured, nominal 0.055" thick	973	768	78.9%	GRI-GM17: % HP-OIT: 35% minimum

Notes:

- 1600 hours of UV exposure in accordance with ASTM D7238 implies a total UV chamber residence time of 1920 hours, e.g., 1600 hours of irradiance and 320 hours of darkness with condensation.
- Sheet samples were aged with the shiny side of the sheet facing the UV bulbs.

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February 20, 2014

Mail To:

Grant Palmer
Agru
500 Garrison Road
Georgetown, SC 29440

email: gp@agruamerica.com

Bill To:

<= Same (P O# : 6390-14)

Dear Mr. Palmer:

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

TRI Job Reference Number: E2386-71-06

Material(s) Tested: One Agru 100 mil. Single Sided Microspike LLDPE Geomembrane

Test(s) Requested: 2% Secant (ASTM D5323 via ASTM D638, GM17)
Multi-axial Tensile (ASTM D 5617)

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

Sincerely,

Mansukh Patel
Laboratory Manager
Geosynthetic Services Division
www.GeosyntheticTesting.com



GEOMEMBRANE TEST RESULTS

TRI Client: Agru

Material: Agru 100 mil Single Sided Microspike LLDPE Geomembrane

Sample Identification: F14B0611008

Chevron 7104 LLDPE Resin

Resin Lot# CDN810200

TRI Log #: E2386-71-06

PARAMETER											TEST REPLICATE NUMBER											MEAN	STD. DEV.	
											1	2	3	4	5	6	7	8	9	10				
2% Secant Modulus (ASTM D5323 via ASTM D638, GM17)																								
MD 2% Secant Modulus (psi)		33940	35787	34423	37838	36088																	35615	1535
MD 2% Secant Modulus (ppi)		3632	3593	3704	3950	3887																	3753	158
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TD 2% Secant Modulus (ppi)		4472	4117	4284	3981	3936																	4158	222
Multi-axial Tensile (ASTM D 5617)																								
Test Method A: Centerpoint Deflection Versus Pressure																								
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% Elongation @ Rupture (%)		94	104	97																	98	5		
Failure Description		MDT	MDT	MDT																				
		N-EF	N-EF	N-EF																				
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H	Circular or elliptical hole in the specimen.																							
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N-EF	No edge failure																							
MD Machine Direction		TD Transverse Direction																						

Certificate of Analysis

Shipped To: AGRU AMERICA INC:FERNLEY
2000 Newlands Dr E
FERNLEY NV 89408-8944
USA

Recipient: PALMER
Fax:

Delivery #: 80746923
PO #: 19616
Weight: 192350.000 LB
Ship Date: 09/01/2022
Package: BULK
Mode: Hopper Car
Car #: BPTX367213
Seal No: 304884

Product:
MARLEX 7104 POLYETHYLENE in Bulk

Lot Number: DPH810650

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.33	g/10min
HLMI	ASTM D1238	16.10	g/10min
Pellet Count	ST-905	32	pelet/gram
Production date		20220820	
Density	D1505	0.919	g/cm3

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP (CPChem).
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AMANDA ROBY
QUALITY ASSURANCE SUPERINTENDENT



NewFields

ACCEPTANCE IS FOR GENERAL COMPLIANCE WITH THE CONTRACT DOCUMENTS ONLY. THE CONTRACTOR IS RESPONSIBLE FOR CONFIRMING AND CORRELATING ALL QUANTITIES AND DIMENSIONS; SELECTING FABRICATION PROCESS AND TECHNIQUES FOR CONSTRUCTION; COORDINATING ITS WORK WITH THAT OF ALL OTHER TRADES; AND PERFORMING ITS WORK IN A SAFE AND SATISFACTORY MANNER.

☒ **APPROVED**
☐ **REVISE AND RESUBMIT**

☐ **APPROVED WITH CHANGES NOTED**
☐ **REJECTED**

DATE: Oct 10, 2022 BY: Nikoliya L. Boyanich

For CoA questions contact Leslie Dziamara at +1-832-813-4806



Vergil H. Rhodes, PE, CPlasT - Tech Svc & App Dev Engineer, Geomembranes
Highways 60 & 123, Bartlesville Research and Technology Center, Room 103 PTC
Bartlesville, OK 74003
■ 539-529-4279 ■ rhodevh@cpchem.com ■ Fax: 918-977-7599 ■ www.cpchem.com

November 12, 2021

Filename: Agru Oven and QUV Exposure for HP-OIT Testing_2021_111221.pdf

Nathan Ivy - Corporate Quality Control/Technical Manager
Agru America, Inc.
800 Rockmead #122
Kingwood, TX 77339
281-358-4741

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Please recall your request for testing of oven-exposed and UV-exposed geomembrane samples produced primarily from Marlex® 7104 LLDPE and Marlex® K307 MDPE. Agru blended other components with each of these polyethylenes to produce the geomembrane samples for testing. Geomembrane samples have been received from Agru, and test specimens were taken from the smooth areas of the samples. Test results are reported on the following two pages. The samples were tested for HP-OIT in their as-received condition and were also tested after oven and UV exposures of 90 days and 1600 hours of irradiance, respectively, in accordance with GRI-GM13 and GRI-GM17 requirements.

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- Marlex® 7104 Lot # DNE810980, Agru Roll # GTA0077190117, black sheet, textured, nominal 0.055" thick.

The exposure and testing conditions along with the corresponding test results are tabulated on the next two pages. GM-13 and GM-17 require a minimum % HP-OIT retention after a 90-day oven exposure and after a 1600-hour UV irradiance exposure. These test results indicate the GM-13 and GM-17 minimum % HP-OIT retentions were exceeded by the Agru-supplied K307 and 7104 sheet samples, respectively.

If you have any questions, please feel free to contact me (contact information given above).

Sincerely,

Vergil Rhodes
Polyethylene Technical Service and Applications Development, Geomembrane

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The following oven aging and UV exposure test methods were conducted in accordance with the GRI-GM13 (HDPE) and GRI-GM17 (LLDPE) requirements:

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UV Exposure	1600 UV irradiance hours. Cycle: 20 hours UVA-340 at 75 °C followed by 4 hours dark with condensation at 60 °C. Irradiance was 0.78 W/m ² at wavelength 340 nm. Note: This implies a total UV chamber residence time of 1920 hours, e.g., 1600 hours of irradiance and 320 hours of dark/condensation.	ASTM D7238
HP-OIT	150 °C in an oxygen atmosphere at 500 psi	ASTM D5885

Oven Aging Results:

Sample	Initial HP-OIT (min)	HP-OIT after 90 days of oven aging. (min)	% HP-OIT Retained after 90 days of oven aging.	GRI-GM13 and GRI-GM17 minimum % HP-OIT requirements after 90 days of oven aging.
K307 Lot # PND821550, Agru Roll # GTC0078250016, black sheet, smooth, nominal 0.057" thick	1313	1174	89.4%	GRI-GM13: % HP-OIT: 80% minimum
7104 Lot # DNE810980, Agru Roll # GTA0077190117, black sheet, textured, nominal 0.055" thick	973	802	82.4%	GRI-GM17: % HP-OIT: 60% minimum

Continued on Page 3 - - -

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UV Aging Results:

Sample	Initial HP-OIT (min)	HP-OIT after 1600 hrs of UV exposure. (min)	% HP-OIT Retained after 1600 hrs of UV exposure.	GRI-GM13 and GRI-GM17 minimum % HP-OIT requirements after 1600 hours of UV exposure.
K307 Lot # PND821550, Agru Roll # GTC0078250016, black sheet, smooth, nominal 0.057" thick	1313	1053	80.2%	GRI-GM13: % HP-OIT: 50% minimum
7104 Lot # DNE810980, Agru Roll # GTA0077190117, black sheet, textured, nominal 0.055" thick	973	768	78.9%	GRI-GM17: % HP-OIT: 35% minimum

Notes:

- 1600 hours of UV exposure in accordance with ASTM D7238 implies a total UV chamber residence time of 1920 hours, e.g., 1600 hours of irradiance and 320 hours of darkness with condensation.
- Sheet samples were aged with the shiny side of the sheet facing the UV bulbs.

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APPENDIX H.5 – 80-MIL LLDPE GEOMEMBRANE INVENTORY CONTROL

VLF 2 Phase 3

Stage A.1 Record of Construction

80-mil LLDPE Geomembrane Site Inventory Control

Roll Number	Resin Lot Number	Width (ft)	Length (ft)	Area (sf)	Conformance Test	Agru QC Certification	Resin Certification	Site Delivery Date
FNA0091850001	DNK810410	23	410	9,430	x	x	x	04/21/22
FNA0091850002	DNK810410	23	410	9,430		x	x	04/21/22
FNA0091850003	DNK810410	23	410	9,430		x	x	04/21/22
FNA0091850004	DNK810410	23	410	9,430		x	x	04/21/22
FNA0091850005	DNK810410	23	410	9,430		x	x	04/21/22
FNA0091850006	DNK810410	23	410	9,430		x	x	04/21/22
FNA0091850007	DNK810410	23	410	9,430		x	x	04/21/22
FNA0091850008	DNK810410	23	410	9,430		x	x	04/21/22
FNA0091850009	DNK810410	23	410	9,430		x	x	04/21/22
FNA0091850010	DNK810410	23	410	9,430		x	x	04/21/22
FNA0091850011	DNK810410	23	410	9,430		x	x	04/21/22
FNA0091850012	DNK810410	23	410	9,430		x	x	04/21/22
FNA0091850013	DNK810410	23	410	9,430		x	x	04/20/22
FNA0091850014	DNK810410	23	410	9,430		x	x	04/20/22
FNA0091850015	DNK810410	23	410	9,430		x	x	04/20/22
FNA0091850016	DNK810410	23	410	9,430	x	x	x	04/20/22
FNA0091850017	DNK810410	23	410	9,430		x	x	04/20/22
FNA0091850018	DNK810410	23	410	9,430		x	x	04/20/22
FNA0091850019	DNK810410	23	410	9,430		x	x	04/20/22
FNA0091850020	DNK810410	23	410	9,430		x	x	04/20/22
FNA0091850021	DNK810410	23	410	9,430		x	x	04/20/22
FNA0091850022	DNK810410	23	410	9,430		x	x	04/20/22
FNA0091850023	DNK810410	23	410	9,430		x	x	04/20/22
FNA0091850024	DNK810410	23	410	9,430		x	x	04/20/22
FNA0091850025	DNK810410	23	410	9,430		x	x	04/19/22
FNA0091850026	DNK810410	23	410	9,430		x	x	04/19/22
FNA0091850027	DNK810410	23	410	9,430		x	x	04/19/22
FNA0091850028	DNK810410	23	410	9,430		x	x	04/19/22
FNA0091850029	DNK810410	23	410	9,430		x	x	04/19/22
FNA0091850030	DNK810410	23	410	9,430		x	x	04/19/22
FNA0091850031	DNK810410	23	410	9,430	x	x	x	04/19/22
FNA0091850032	DNK810410	23	410	9,430		x	x	04/19/22
FNA0091850033	DNK810410	23	410	9,430		x	x	04/19/22
FNA0091850034	DNK810410	23	410	9,430		x	x	04/19/22
FNA0091850035	DNK810410	23	410	9,430		x	x	04/19/22
FNA0091850036	DNK810410	23	410	9,430		x	x	04/19/22
FNA0091850037	DNK810410	23	410	9,430		x	x	04/26/22
FNA0091850038	DNK810410	23	410	9,430		x	x	04/26/22
FNA0091850039	DNK810410	23	410	9,430		x	x	04/26/22
FNA0091850040	DNK810410	23	410	9,430		x	x	04/26/22
FNA0091850041	DNK810410	23	410	9,430		x	x	04/26/22
FNA0091850042	DNK810410	23	410	9,430		x	x	04/26/22
FNA0091850043	DNK810410	23	410	9,430		x	x	04/26/22

VLF 2 Phase 3

Stage A.1 Record of Construction

80-mil LLDPE Geomembrane Site Inventory Control

Roll Number	Resin Lot Number	Width (ft)	Length (ft)	Area (sf)	Conformance Test	Agru QC Certification	Resin Certification	Site Delivery Date
FNA0091850044	DNK810410	23	410	9,430		x	x	04/26/22
FNA0091850045	DNK810410	23	410	9,430		x	x	04/26/22
FNA0091850046	DNK810410	23	410	9,430	x	x	x	04/26/22
FNA0091850047	DNK810410	23	410	9,430		x	x	04/26/22
FNA0091850048	DNK810410	23	410	9,430		x	x	04/26/22
FNA0091850049	DNK810410	23	410	9,430		x	x	04/27/22
FNA0091850050	DNK810410	23	410	9,430		x	x	04/27/22
FNA0091850051	DNK810410	23	410	9,430		x	x	04/27/22
FNA0091850052	DNK810410	23	410	9,430		x	x	04/27/22
FNA0091850053	DNK810410	23	410	9,430		x	x	04/27/22
FNA0091850054	DNK810410	23	410	9,430		x	x	04/27/22
FNA0091850055	21KB544	23	410	9,430		x	x	04/27/22
FNA0091850056	21KB544	23	410	9,430	x	x	x	04/27/22
FNA0091850057	21KB544	23	410	9,430		x	x	04/27/22
FNA0091850058	21KB544	23	410	9,430		x	x	04/27/22
FNA0091850059	21KB544	23	410	9,430		x	x	04/27/22
FNA0091850060	21KB544	23	410	9,430		x	x	04/27/22
FNA0091850061	21KB544	23	410	9,430		x	x	04/21/22
FNA0091850062	21KB544	23	410	9,430		x	x	04/21/22
FNA0091850063	21KB544	23	410	9,430		x	x	04/21/22
FNA0091850064	21KB544	23	410	9,430		x	x	04/21/22
FNA0091850065	21KB544	23	410	9,430		x	x	04/21/22
FNA0091850066	21KB544	23	410	9,430		x	x	04/21/22
FNA0091850067	21KB544	23	410	9,430		x	x	04/21/22
FNA0091850068	21KB544	23	410	9,430		x	x	04/21/22
FNA0091850069	21KB544	23	410	9,430		x	x	04/21/22
FNA0091850070	21KB544	23	410	9,430		x	x	04/21/22
FNA0091850071	21KB544	23	410	9,430	x	x	x	04/21/22
FNA0091850072	21KB544	23	410	9,430		x	x	04/21/22
FNA0091850073	21KB544	23	410	9,430		x	x	04/21/22
FNA0091850074	21KB544	23	410	9,430		x	x	04/21/22
FNA0091850075	21KB544	23	410	9,430		x	x	04/21/22
FNA0091850076	21KB544	23	410	9,430		x	x	04/21/22
FNA0091850077	21KB544	23	410	9,430		x	x	04/21/22
FNA0091850078	21KB544	23	410	9,430		x	x	04/21/22
FNA0091850079	21KB544	23	410	9,430		x	x	04/21/22
FNA0091850080	21KB544	23	410	9,430		x	x	04/21/22
FNA0091850081	21KB544	23	410	9,430		x	x	04/21/22
FNA0091850083	21KB544	23	410	9,430		x	x	04/21/22
FNA0091850084	21KB544	23	410	9,430		x	x	04/21/22
FNA0091850085	21KB544	23	410	9,430		x	x	04/21/22
FNA0091850086	21KB544	23	410	9,430		x	x	04/21/22
FNA0091850087	21KB544	23	410	9,430	x	x	x	04/21/22
FNA0091850088	21KB544	23	410	9,430		x	x	04/21/22

VLF 2 Phase 3

Stage A.1 Record of Construction

80-mil LLDPE Geomembrane Site Inventory Control

Roll Number	Resin Lot Number	Width (ft)	Length (ft)	Area (sf)	Conformance Test	Agru QC Certification	Resin Certification	Site Delivery Date
FNA0091850089	21KB544	23	410	9,430		x	x	04/21/22
FNA0091850090	21KB544	23	410	9,430		x	x	04/21/22
FNA0091850091	21KB544	23	410	9,430		x	x	04/21/22
FNA0091850092	21KB544	23	410	9,430		x	x	04/21/22
FNA0091850093	21KB544	23	410	9,430		x	x	04/21/22
FNA0091850094	21KB544	23	410	9,430		x	x	04/21/22
FNA0091850095	21KB544	23	410	9,430		x	x	04/21/22
FNA0091850096	21KB544	23	410	9,430		x	x	04/21/22
FNA0091850097	21KB544	23	410	9,430		x	x	04/21/22
FNA0091850098	21KB544	23	410	9,430		x	x	04/21/22
FNA0091850099	21KB544	23	410	9,430		x	x	04/21/22
FNA0091850100	21KB544	23	410	9,430		x	x	04/21/22
FNA0091850101	21KB544	23	410	9,430		x	x	04/21/22
FNA0091850102	21KB544	23	410	9,430	x	x	x	04/21/22
FNA0091850103	21KB544	23	410	9,430		x	x	04/21/22
FNA0091850104	21KB544	23	410	9,430		x	x	04/21/22
FNA0091850105	21KB544	23	410	9,430		x	x	04/21/22
FNA0091850106	21KB544	23	410	9,430		x	x	04/21/22
FNA0091850107	21KB544	23	410	9,430		x	x	04/21/22
FNA0091850108	21KB544	23	410	9,430		x	x	04/21/22
FNA0091850109	21KB544	23	410	9,430		x	x	04/21/22
FNA0091850110	21KB544	23	410	9,430		x	x	04/19/22
FNA0091850111	21KB544	23	410	9,430		x	x	04/19/22
FNA0091850112	21KB544	23	410	9,430		x	x	04/19/22
FNA0091850113	21KB544	23	410	9,430		x	x	04/19/22
FNA0091850114	21KB544	23	410	9,430		x	x	04/19/22
FNA0091850115	21KB544	23	410	9,430		x	x	04/19/22
FNA0091850116	21KB544	23	410	9,430		x	x	04/19/22
FNA0091850117	21KB544	23	410	9,430		x	x	04/19/22
FNA0091850118	21KB544	23	410	9,430		x	x	04/19/22
FNA0091850119	21KB544	23	410	9,430		x	x	04/19/22
FND0103600003	DPF811480	23	410	9,430	x	x	x	10/11/22
FND0103600004	DPF811480	23	410	9,430		x	x	10/11/22
FND0103600005	DPF811480	23	410	9,430		x	x	10/11/22
FND0103600006	DPF811480	23	410	9,430		x	x	10/11/22
FND0103600007	DPF811480	23	410	9,430		x	x	10/11/22
FND0103600008	DPF811480	23	410	9,430		x	x	10/11/22
FND0103600009	DPF811480	23	410	9,430		x	x	10/11/22
FND0103600010	DPF811480	23	410	9,430		x	x	10/11/22
FND0103600011	DPF811480	23	410	9,430		x	x	09/30/22
FND0103600012	DPF811480	23	410	9,430		x	x	09/30/22
FND0103600013	DPF811480	23	410	9,430		x	x	09/30/22
FND0103600014	DPF811480	23	410	9,430		x	x	09/30/22
FND0103600015	DPF811480	23	410	9,430		x	x	10/03/22

VLF 2 Phase 3

Stage A.1 Record of Construction

80-mil LLDPE Geomembrane Site Inventory Control

Roll Number	Resin Lot Number	Width (ft)	Length (ft)	Area (sf)	Conformance Test	Agru QC Certification	Resin Certification	Site Delivery Date
FND0103600016	DPF811480	23	410	9,430		x	x	10/03/22
FND0103600017	DPF811480	23	410	9,430		x	x	10/03/22
FND0103600018	DPF811480	23	410	9,430	x	x	x	10/03/22
FND0103600019	DPF811480	23	410	9,430		x	x	10/03/22
FND0103600020	DPF811480	23	410	9,430		x	x	10/03/22
FND0103600021	DPF811480	23	410	9,430		x	x	10/03/22
FND0103600022	DPF811480	23	410	9,430		x	x	10/03/22
FND0103600023	DPF811480	23	410	9,430		x	x	10/03/22
FND0103600024	DPF811480	23	410	9,430		x	x	10/03/22
FND0103600025	DPF811480	23	410	9,430		x	x	10/03/22
FND0103600026	DPF811480	23	410	9,430		x	x	10/03/22
FND0103600027	DPF811480	23	410	9,430		x	x	09/27/22
FND0103600028	DPF811480	23	410	9,430		x	x	09/27/22
FND0103600029	DPF811480	23	410	9,430		x	x	09/27/22
FND0103600030	DPF811480	23	410	9,430		x	x	09/27/22
FND0103600031	DPF811480	23	410	9,430		x	x	09/27/22
FND0103600032	DPF811480	23	410	9,430		x	x	09/27/22
FND0103600033	DPF811480	23	410	9,430	x	x	x	09/27/22
FND0103600034	DPF811480	23	410	9,430		x	x	09/27/22
FND0103600035	DPF811480	23	410	9,430		x	x	09/27/22
FND0103600036	DPF811480	23	410	9,430		x	x	09/27/22
FND0103600037	DPF811480	23	410	9,430		x	x	09/27/22
FND0103600038	DPF811480	23	410	9,430		x	x	09/27/22
FND0103600039	DPF811480	23	410	9,430		x	x	10/03/22
FND0103600040	DPF811480	23	410	9,430		x	x	10/03/22
FND0103600041	DPF811480	23	410	9,430		x	x	10/03/22
FND0103600042	DPF811480	23	410	9,430		x	x	10/03/22
FND0103600043	DPF811480	23	410	9,430		x	x	10/03/22
FND0103600044	DPF811480	23	410	9,430		x	x	10/03/22
FND0103600045	DPF811480	23	410	9,430		x	x	10/03/22
FND0103600046	DPF811480	23	410	9,430		x	x	10/03/22
FND0103600047	DPF811480	23	410	9,430		x	x	10/03/22
FND0103600048	DPF811480	23	410	9,430	x	x	x	10/03/22
FND0103600049	DPF811480	23	410	9,430		x	x	10/03/22
FND0103600050	DPF811480	23	410	9,430		x	x	10/03/22
FND0103600051	DPF811480	23	410	9,430		x	x	10/03/22
FND0103600052	DPF811480	23	410	9,430		x	x	10/03/22
FND0103600053	DPF811480	23	410	9,430		x	x	10/03/22
FND0103600054	DPF811480	23	410	9,430		x	x	10/03/22
FND0103600055	DPF811480	23	410	9,430		x	x	10/03/22
FND0103600056	DPF811480	23	410	9,430		x	x	10/03/22
FND0103600057	DPF811480	23	410	9,430		x	x	10/03/22
FND0103600058	DPF811480	23	410	9,430		x	x	10/03/22
FND0103600059	DPF811480	23	410	9,430		x	x	10/03/22

VLF 2 Phase 3

Stage A.1 Record of Construction

80-mil LLDPE Geomembrane Site Inventory Control

Roll Number	Resin Lot Number	Width (ft)	Length (ft)	Area (sf)	Conformance Test	Agru QC Certification	Resin Certification	Site Delivery Date
FND0103600060	DPF811480	23	410	9,430		x	x	10/03/22
FND0103600061	DPF811480	23	410	9,430		x	x	10/03/22
FND0103600062	DPF811480	23	410	9,430		x	x	10/03/22
FND0103600063	DPF811480	23	410	9,430	x	x	x	10/05/22
FND0103600064	DPF811480	23	410	9,430		x	x	10/05/22
FND0103600065	DPH810510	23	410	9,430		x	x	10/05/22
FND0103600066	DPH810510	23	410	9,430		x	x	10/05/22
FND0103600067	DPH810510	23	410	9,430		x	x	10/05/22
FND0103600068	DPH810510	23	410	9,430		x	x	10/05/22
FND0103600069	DPH810510	23	410	9,430		x	x	10/05/22
FND0103600070	DPH810510	23	410	9,430		x	x	10/05/22
FND0103600071	DPH810510	23	410	9,430		x	x	10/05/22
FND0103600072	DPH810510	23	410	9,430		x	x	10/05/22
FND0103600073	DPH810510	23	410	9,430		x	x	10/05/22
FND0103600074	DPF811480	23	410	9,430		x	x	10/05/22
FND0103600075	DPF811480	23	410	9,430		x	x	10/10/22
FND0103600076	DPF811480	23	410	9,430		x	x	10/10/22
FND0103600077	DPF811480	23	410	9,430		x	x	10/10/22
FND0103600078	DPF811350	23	410	9,430	x	x	x	10/10/22
FND0103600079	DPF811350	23	410	9,430		x	x	10/10/22
FND0103600080	DPF811350	23	410	9,430		x	x	10/10/22
FND0103600081	DPF811350	23	410	9,430		x	x	10/10/22
FND0103600082	DPF811350	23	410	9,430		x	x	10/10/22
FND0103600083	DPF811350	23	410	9,430		x	x	10/10/22
FND0103600084	DPF811350	23	410	9,430		x	x	10/10/22
FND0103600085	DPF811350	23	410	9,430		x	x	10/10/22
FND0103600087	DPF811350	23	410	9,430		x	x	10/06/22
FND0103600088	DPF811350	23	410	9,430		x	x	10/06/22
FND0103600089	DPF811350	23	410	9,430		x	x	10/06/22
FND0103600090	DPF811350	23	410	9,430		x	x	10/06/22
FND0103600091	DPF811350	23	410	9,430		x	x	10/06/22
FND0103600092	DPF811350	23	410	9,430		x	x	10/06/22
FND0103600093	DPF811350	23	410	9,430		x	x	10/06/22
FND0103600094	DPF811350	23	410	9,430	x	x	x	10/06/22
FND0103600095	DPH810510	23	410	9,430		x	x	10/06/22
FND0103600096	DPH810510	23	410	9,430		x	x	10/06/22
FND0103600097	DPH810510	23	410	9,430		x	x	10/06/22
FND0103600098	DPH810510	23	410	9,430		x	x	10/06/22
FND0103600099	DPH810510	23	410	9,430		x	x	10/07/22
FND0103600100	DPH810510	23	410	9,430		x	x	10/07/22
FND0103600101	DPH810510	23	410	9,430		x	x	10/07/22
FND0103600102	DPH810510	23	410	9,430		x	x	10/07/22
FND0103600103	DPH810510	23	410	9,430		x	x	10/07/22
FND0103600106	DPH810510	23	410	9,430		x	x	10/07/22

VLF 2 Phase 3

Stage A.1 Record of Construction

80-mil LLDPE Geomembrane Site Inventory Control

Roll Number	Resin Lot Number	Width (ft)	Length (ft)	Area (sf)	Conformance Test	Agru QC Certification	Resin Certification	Site Delivery Date
FND0103600107	DPH810510	23	410	9,430		x	x	10/07/22
FND0103600108	DPH810510	23	410	9,430		x	x	10/07/22
FND0103600109	DPH810510	23	410	9,430		x	x	10/07/22
FND0103600110	DPH810510	23	410	9,430		x	x	10/07/22
FND0103600111	DPH810510	23	410	9,430	x	x	x	10/07/22
FND0103600112	DPH810510	23	410	9,430		x	x	10/07/22
FND0103600114	DPH810510	23	410	9,430		x	x	10/05/22
FND0103600115	DPH810510	23	410	9,430		x	x	10/05/22
FND0103600116	DPH810510	23	410	9,430		x	x	10/05/22
FND0103600117	DPH810510	23	410	9,430		x	x	10/05/22
FND0103600118	DPH810510	23	410	9,430		x	x	10/05/22
FND0103600119	DPH810510	23	410	9,430		x	x	10/05/22
FND0103600120	DPH810510	23	410	9,430		x	x	10/05/22
FND0103600121	DPH810510	23	410	9,430		x	x	10/05/22
FND0103600122	DPH810510	23	410	9,430		x	x	10/05/22
FND0103600123	DPH810510	23	410	9,430		x	x	10/05/22
FND0103600124	DPH810510	23	410	9,430		x	x	10/05/22
FND0103600125	DPH810510	23	410	9,430		x	x	10/05/22
FND0103600126	DPH810510	23	410	9,430		x	x	10/10/22
FND0103600127	DPH810510	23	410	9,430	x	x	x	10/06/22
FND0103600128	DPH810510	23	410	9,430		x	x	10/06/22
FND0103600129	DPH810510	23	410	9,430		x	x	10/06/22
FND0103600130	DPH810510	23	410	9,430		x	x	10/06/22
FND0103600131	DPH810510	23	410	9,430		x	x	10/06/22
FND0103600132	DPH810510	23	410	9,430		x	x	10/06/22
FND0103600133	DPH810510	23	410	9,430		x	x	10/06/22
FND0103600134	DPH810510	23	410	9,430		x	x	10/06/22
FND0103600135	DPH810510	23	410	9,430		x	x	10/06/22
FND0103600136	DPH810510	23	410	9,430		x	x	10/06/22
FND0103600137	DPH810510	23	410	9,430		x	x	10/06/22
FND0103600138	DPH810510	23	410	9,430		x	x	10/06/22
FND0103600139	DPH810510	23	410	9,430		x	x	10/07/22
FND0103600140	DPH810510	23	410	9,430		x	x	10/07/22
FND0103600141	DPH810510	23	410	9,430		x	x	10/07/22
FND0103600142	DPH810510	23	410	9,430	x	x	x	10/07/22
FND0103600143	DPH810510	23	410	9,430		x	x	10/07/22
FND0103600144	DPH810510	23	410	9,430		x	x	10/07/22
FND0103600145	DPH810510	23	410	9,430		x	x	10/07/22
FND0103600146	DPH810510	23	410	9,430		x	x	10/07/22
FND0103600147	DPH810510	23	410	9,430		x	x	10/07/22
FND0103600148	DPH810510	23	410	9,430		x	x	10/07/22
FND0103600149	DPH810510	23	410	9,430		x	x	10/07/22
FND0103600150	DPH810510	23	410	9,430		x	x	10/07/22
FND0103600151	DPH810510	23	410	9,430		x	x	10/12/22

VLF 2 Phase 3

Stage A.1 Record of Construction

80-mil LLDPE Geomembrane Site Inventory Control

Roll Number	Resin Lot Number	Width (ft)	Length (ft)	Area (sf)	Conformance Test	Agru QC Certification	Resin Certification	Site Delivery Date
FND0103600152	DPH810510	23	410	9,430		x	x	10/12/22
FND0103600153	DPH810510	23	410	9,430		x	x	10/12/22
FND0103600154	DPH810510	23	410	9,430		x	x	10/12/22
FND0103600155	DPH810510	23	410	9,430		x	x	10/12/22
FND0103600156	DPH810510	23	410	9,430		x	x	10/12/22
FND0103600157	DPH810510	23	410	9,430	x	x	x	10/12/22
FND0103600158	DPH810510	23	410	9,430		x	x	10/12/22
FND0103600159	DPH810510	23	410	9,430		x	x	10/12/22
FND0103600160	DPH810510	23	410	9,430		x	x	10/12/22
FND0103600161	DPH810510	23	410	9,430		x	x	10/12/22
FND0103600162	DPH810510	23	410	9,430		x	x	10/12/22
FND0103600163	DPH810510	23	410	9,430		x	x	10/12/22
FND0103600164	DPH810510	23	410	9,430		x	x	10/12/22
FND0103600165	DPH810510	23	410	9,430		x	x	10/12/22
FND0103600166	DPH810510	23	410	9,430		x	x	10/12/22
FND0103600167	DPH810510	23	410	9,430		x	x	10/12/22
FND0103600168	DPH810510	23	410	9,430		x	x	10/12/22
FND0103600169	DPH810510	23	410	9,430		x	x	10/12/22
FND0103600170	DPH810510	23	410	9,430		x	x	10/12/22
FND0103600171	DPH810510	23	410	9,430		x	x	10/12/22
FND0103600173	DPH810510	23	410	9,430	x	x	x	10/12/22
FND0103600174	DPH810510	23	410	9,430		x	x	10/12/22
FND0103600175	DPH810510	23	410	9,430		x	x	10/12/22
FND0103600176	DPH810510	23	410	9,430		x	x	10/12/22
FND0103600177	DPH810510	23	410	9,430		x	x	10/12/22
FND0103600178	DPH810510	23	410	9,430		x	x	10/12/22
FND0103600179	DPH810510	23	410	9,430		x	x	10/12/22
FND0103600180	DPH810510	23	410	9,430		x	x	10/12/22
FND0103600181	DPH810510	23	410	9,430		x	x	10/12/22
FND0103600182	DPH810510	23	410	9,430		x	x	10/12/22
FND0103600183	DPH810510	23	410	9,430		x	x	10/12/22
FND0103600184	DPH810510	23	410	9,430		x	x	10/12/22
FND0103600185	DPH810510	23	410	9,430		x	x	10/12/22
FND0103600186	DPH810510	23	410	9,430		x	x	10/12/22
FND0103600187	DPH810510	23	410	9,430		x	x	10/12/22
FND0103600188	DPH810490	23	410	9,430	x	x	x	10/12/22
FND0103600189	DPH810490	23	410	9,430		x	x	10/12/22
FND0103600190	DPH810490	23	410	9,430		x	x	10/12/22
FND0103600191	DPH810490	23	410	9,430		x	x	10/12/22
FND0103600192	DPH810490	23	410	9,430		x	x	10/12/22
FND0103600193	DPH810490	23	410	9,430		x	x	10/12/22
FND0103600194	DPH810490	23	410	9,430		x	x	10/12/22
FND0103600195	DPH810490	23	410	9,430		x	x	10/12/22
FND0103600196	DPH810490	23	410	9,430		x	x	10/12/22

VLF 2 Phase 3

Stage A.1 Record of Construction

80-mil LLDPE Geomembrane Site Inventory Control

Roll Number	Resin Lot Number	Width (ft)	Length (ft)	Area (sf)	Conformance Test	Agru QC Certification	Resin Certification	Site Delivery Date
FND0103600197	DPH810490	23	410	9,430		x	x	10/12/22
FND0103600198	DPH810490	23	410	9,430		x	x	10/12/22
FND0103600199	DPH810490	23	410	9,430		x	x	10/12/22
FND0103600200	DPH810490	23	410	9,430		x	x	10/13/22
FND0103600201	DPH810490	23	410	9,430		x	x	10/13/22
FND0103600202	DPH810490	23	410	9,430		x	x	10/13/22
FND0103600203	DPH810490	23	410	9,430	x	x	x	10/13/22
FND0103600204	DPH810490	23	410	9,430		x	x	10/13/22
FND0103600205	DPH810490	23	410	9,430		x	x	10/13/22
FND0103600206	DPH810490	23	410	9,430		x	x	10/13/22
FND0103600207	DPH810490	23	410	9,430		x	x	10/13/22
FND0103600208	DPH810490	23	410	9,430		x	x	10/13/22
FND0103600209	DPH810490	23	410	9,430		x	x	10/13/22
FND0103600210	DPH810490	23	410	9,430		x	x	10/13/22
FND0103600211	DPH810490	23	410	9,430		x	x	10/13/22
FND0103600212	DPH810490	23	410	9,430		x	x	10/12/22
FND0103600213	DPH810490	23	410	9,430		x	x	10/12/22
FND0103600214	DPH810490	23	410	9,430		x	x	10/12/22
FND0103600215	DPH810490	23	410	9,430		x	x	10/12/22
FND0103600216	DPH810490	23	410	9,430		x	x	10/12/22
FND0103600217	DPH810490	23	410	9,430		x	x	10/12/22
FND0103600218	DPH810490	23	410	9,430	x	x	x	10/12/22
FND0103600219	DPH810490	23	410	9,430		x	x	10/12/22
FND0103600220	DPH810490	23	410	9,430		x	x	10/12/22
FND0103600222	DPH810490	23	410	9,430		x	x	10/12/22
FND0103600223	DPH810490	23	410	9,430		x	x	10/12/22
FND0103600224	DPH810490	23	410	9,430		x	x	10/12/22
FND0103600225	DPH810490	23	410	9,430		x	x	10/17/22
FND0103600226	DPH810490	23	410	9,430		x	x	10/17/22
FND0103600227	DPH810490	23	410	9,430		x	x	10/14/22
FND0103600228	DPH810490	23	410	9,430		x	x	10/14/22
FND0103600229	DPH810490	23	410	9,430		x	x	10/14/22
FND0103600230	DPH810490	23	410	9,430		x	x	10/14/22
FND0103600231	DPH810490	23	410	9,430		x	x	10/14/22
FND0103600232	DPH810490	23	410	9,430		x	x	10/14/22
FND0103600233	DPH810490	23	410	9,430		x	x	10/14/22
FND0103600234	DPH810490	23	410	9,430		x	x	10/14/22
FND0103600235	DPH810490	23	410	9,430		x	x	10/14/22
FND0103600236	DPH810490	23	410	9,430		x	x	10/14/22
FND0103600237	DPH810490	23	410	9,430		x	x	10/14/22
FND0103600238	DPH810490	23	410	9,430		x	x	10/14/22



APPENDIX H.6 – 80-MIL LLDPE GEOMEMBRANE ROLL QC CERTIFICATES



Geomembrane Quality Certification

Customer: Newmont Mining
Project:
Destination:
Report Date: 30-Mar-2022 10:39 AM

S.O.# SO00013688
Item Number: FG-LDMSDS080BBBEG
Liner Type: LLDPE DS MicroSpike 80mil Black GM17
Roll Count: 118

#	Roll Number	Prod. Date	Width (ft)	Length (ft)	Area (sqft)	Weight (lb)	Resin Lot#	ASTM D5994		ASTM D7466		ASTM D8117	ASTM D792	ASTM D1248	ASTM D4218	ASTM D5596	ASTM D6693			ASTM D1004			ASTM D4833
								Thickness-Min	Thickness-Avg	Asperity (top)	Asperity (bottom)	OIT	Density	Melt Flow	Carbon Content	Category 1 Disp.	Tensile Break Str (MD)	Break Elong (MD)	Tensile Break Str (TD)	Break Elong (TD)	Tear Strength (MD)	Tear Strength (TD)	Puncture Resistance
								mil	mil	mil	mil	minut	g/cc	g/10	%	Categ	ppi	%	ppi	%	lb	lb	lb
1	FNA0091850001	02/24/22	23	410	9430	3824	DNK810410	73	78	29	32	217	0.932	0.34	2.7	10	238	531	257	616	63	64	148
2	FNA0091850002	02/24/22	23	410	9430	3820	DNK810410	75	78	29	35	217	0.932	0.34	2.7	10	238	531	257	616	63	64	148
3	FNA0091850003	02/24/22	23	410	9430	3810	DNK810410	75	79	30	32	217	0.932	0.34	2.7	10	238	531	257	616	63	64	148
4	FNA0091850004	02/24/22	23	410	9430	3806	DNK810410	74	78	31	30	217	0.932	0.34	2.6	10	238	531	257	616	63	64	148
5	FNA0091850005	02/24/22	23	410	9430	3816	DNK810410	75	78	29	34	217	0.932	0.34	2.7	10	238	531	257	616	63	64	148
6	FNA0091850006	02/24/22	23	410	9430	3812	DNK810410	72	77	31	30	217	0.932	0.34	2.4	10	230	520	256	618	63	64	148
7	FNA0091850007	02/24/22	23	410	9430	3812	DNK810410	73	78	30	32	217	0.932	0.34	2.4	10	230	520	256	618	63	64	148
8	FNA0091850008	02/24/22	23	410	9430	3812	DNK810410	73	77	29	30	217	0.932	0.34	2.4	10	230	520	256	618	63	64	148
9	FNA0091850009	02/24/22	23	410	9430	3812	DNK810410	74	77	28	30	217	0.932	0.34	2.6	10	230	520	256	618	63	64	148
10	FNA0091850010	02/24/22	23	410	9430	3812	DNK810410	73	77	34	30	217	0.932	0.34	2.4	10	230	520	256	618	63	64	148
11	FNA0091850011	02/24/22	23	410	9430	3816	DNK810410	73	77	29	32	217	0.936	0.34	2.6	10	240	523	255	612	62	63	148
12	FNA0091850012	02/25/22	23	410	9430	3810	DNK810410	71	78	30	29	217	0.936	0.34	2.6	10	240	523	255	612	62	63	148
13	FNA0091850013	02/25/22	23	410	9430	3812	DNK810410	72	79	29	32	217	0.936	0.34	2.6	10	240	523	255	612	62	63	148
14	FNA0091850014	02/25/22	23	410	9430	3818	DNK810410	73	78	29	33	217	0.936	0.34	2.4	10	240	523	255	612	62	63	148
15	FNA0091850015	02/25/22	23	410	9430	3814	DNK810410	71	76	29	30	217	0.936	0.34	2.6	10	240	523	255	612	62	63	148
16	FNA0091850016	02/25/22	23	410	9430	3806	DNK810410	74	76	29	28	217	0.936	0.34	2.7	10	237	541	252	594	62	63	148
17	FNA0091850017	02/25/22	23	410	9430	3820	DNK810410	72	76	29	30	217	0.936	0.34	2.7	10	237	541	252	594	62	63	148
18	FNA0091850018	02/25/22	23	410	9430	3818	DNK810410	72	76	30	32	217	0.936	0.34	2.7	10	237	541	252	594	62	63	148
19	FNA0091850019	02/25/22	23	410	9430	3816	DNK810410	73	76	30	32	217	0.936	0.34	2.7	10	237	541	252	594	62	63	148
20	FNA0091850020	02/25/22	23	410	9430	3814	DNK810410	74	77	28	32	217	0.936	0.34	2.7	10	237	541	252	594	62	63	148
21	FNA0091850021	02/25/22	23	410	9430	3812	DNK810410	73	77	28	30	217	0.935	0.34	2.5	10	246	562	262	628	62	60	147
22	FNA0091850022	02/25/22	23	410	9430	3812	DNK810410	73	76	28	31	217	0.935	0.34	2.5	10	246	562	262	628	62	60	147
23	FNA0091850023	02/25/22	23	410	9430	3814	DNK810410	75	77	31	35	217	0.935	0.34	2.5	10	246	562	262	628	62	60	147
24	FNA0091850024	02/25/22	23	410	9430	3820	DNK810410	73	76	29	33	217	0.935	0.34	2.5	10	246	562	262	628	62	60	147
25	FNA0091850025	02/25/22	23	410	9430	3824	DNK810410	73	77	27	31	217	0.935	0.34	2.5	10	246	562	262	628	62	60	147
26	FNA0091850026	02/25/22	23	410	9430	3814	DNK810410	74	78	29	30	217	0.935	0.34	2.3	10	249	541	264	594	62	60	147
27	FNA0091850027	02/25/22	23	410	9430	3812	DNK810410	73	78	28	29	217	0.935	0.34	2.3	10	249	541	264	594	62	60	147
28	FNA0091850028	02/25/22	23	410	9430	3814	DNK810410	73	77	29	32	217	0.935	0.34	2.3	10	249	541	264	594	62	60	147
29	FNA0091850029	02/26/22	23	410	9430	3814	DNK810410	75	77	29	31	217	0.935	0.34	2.6	10	249	541	264	594	62	60	147
30	FNA0091850030	02/26/22	23	410	9430	3824	DNK810410	74	77	29	29	217	0.935	0.34	2.3	10	249	541	264	594	62	60	147
31	FNA0091850031	02/26/22	23	410	9430	3796	DNK810410	72	77	29	30	217	0.933	0.34	2.4	10	250	539	264	617	70	72	146
32	FNA0091850032	02/26/22	23	410	9430	3820	DNK810410	73	77	29	31	217	0.933	0.34	2.4	10	250	539	264	617	70	72	146

#	Roll Number	Prod. Date	Width (ft)	Length (ft)	Area (sqft)	Weight (lb)	Resin Lot#	ASTM D5994		ASTM D7466		ASTM D8117	ASTM D792	ASTM D1248	ASTM D4218	ASTM D5596	ASTM D6693			ASTM D1004			ASTM D4833
								Thickness-Min	Thickness-Avg	Asperity (top)	Asperity (bottom)	OIT	Density	Melt Flow	Carbon Content	Category 1 Disp.	Tensile Break Str (MD)	Break Elong (MD)	Tensile Break Str (TD)	Break Elong (TD)	Tear Strength (MD)	Tear Strength (TD)	Puncture Resistance
								mil	mil	mil	mil												
33	FNA0091850033	02/26/22	23	410	9430	3826	DNK810410	73	77	27	34	217	0.933	0.34	2.4	10	250	539	264	617	70	72	146
34	FNA0091850034	02/26/22	23	410	9430	3828	DNK810410	73	76	32	31	217	0.933	0.34	2.2	10	250	539	264	617	70	72	146
35	FNA0091850035	02/26/22	23	410	9430	3816	DNK810410	72	76	31	31	217	0.933	0.34	2.4	10	250	539	264	617	70	72	146
36	FNA0091850036	02/26/22	23	410	9430	3820	DNK810410	72	76	30	31	217	0.933	0.34	2.5	10	243	529	263	604	70	72	146
37	FNA0091850037	02/26/22	23	410	9430	3824	DNK810410	73	76	31	31	217	0.933	0.34	2.5	10	243	529	263	604	70	72	146
38	FNA0091850038	02/26/22	23	410	9430	3820	DNK810410	73	76	31	31	217	0.933	0.34	2.5	10	243	529	263	604	70	72	146
39	FNA0091850039	02/26/22	23	410	9430	3820	DNK810410	74	76	31	32	217	0.933	0.34	2.5	10	243	529	263	604	70	72	146
40	FNA0091850040	02/26/22	23	410	9430	3814	DNK810410	73	76	31	31	217	0.933	0.34	2.5	10	243	529	263	604	70	72	146
41	FNA0091850041	02/26/22	23	410	9430	3816	DNK810410	74	77	30	32	217	0.933	0.34	2.5	10	254	540	274	609	69	66	151
42	FNA0091850042	02/26/22	23	410	9430	3812	DNK810410	74	77	31	32	217	0.933	0.34	2.5	10	254	540	274	609	69	66	151
43	FNA0091850043	02/26/22	23	410	9430	3812	DNK810410	76	78	30	28	217	0.933	0.34	2.5	10	254	540	274	609	69	66	151
44	FNA0091850044	02/26/22	23	410	9430	3816	DNK810410	75	77	29	31	217	0.933	0.34	2.4	10	254	540	274	609	69	66	151
45	FNA0091850045	02/26/22	23	410	9430	3814	DNK810410	78	78	29	30	217	0.933	0.34	2.5	10	254	540	274	609	69	66	151
46	FNA0091850046	02/27/22	23	410	9430	3810	DNK810410	73	76	29	30	217	0.933	0.34	2.4	10	250	542	261	623	69	66	151
47	FNA0091850047	02/27/22	23	410	9430	3814	DNK810410	78	79	29	32	217	0.933	0.34	2.4	10	250	542	261	623	69	66	151
48	FNA0091850048	02/27/22	23	410	9430	3816	DNK810410	78	79	28	32	217	0.933	0.34	2.4	10	250	542	261	623	69	66	151
49	FNA0091850049	02/27/22	23	410	9430	3814	DNK810410	76	78	27	31	217	0.933	0.34	2.4	10	250	542	261	623	69	66	151
50	FNA0091850050	02/27/22	23	410	9430	3810	DNK810410	78	79	28	31	217	0.933	0.34	2.4	10	250	542	261	623	69	66	151
51	FNA0091850051	02/27/22	23	410	9430	3810	DNK810410	73	77	30	31	217	0.933	0.34	2.8	10	240	560	267	608	68	68	149
52	FNA0091850052	02/27/22	23	410	9430	3818	DNK810410	73	77	27	31	217	0.933	0.34	2.8	10	240	560	267	608	68	68	149
53	FNA0091850053	02/27/22	23	410	9430	3812	DNK810410	74	77	29	30	217	0.933	0.34	2.8	10	240	560	267	608	68	68	149
54	FNA0091850054	02/27/22	23	410	9430	3814	DNK810410	73	77	28	29	217	0.933	0.34	2.5	10	240	560	267	608	68	68	149
55	FNA0091850055	02/27/22	23	410	9430	3810	21KB544	72	77	27	31	192	0.935	0.44	2.8	10	236	538	261	614	68	68	149
56	FNA0091850056	02/27/22	23	410	9430	3804	21KB544	72	77	28	31	192	0.935	0.44	2.7	10	236	538	261	614	68	68	149
57	FNA0091850057	02/27/22	23	410	9430	3804	21KB544	73	77	27	32	192	0.935	0.44	2.7	10	236	538	261	614	68	68	149
58	FNA0091850058	02/27/22	23	410	9430	3806	21KB544	76	77	28	33	192	0.935	0.44	2.7	10	236	538	261	614	68	68	149
59	FNA0091850059	02/27/22	23	410	9430	3802	21KB544	74	76	28	33	192	0.935	0.44	2.5	10	236	538	261	614	68	68	149
60	FNA0091850060	02/27/22	23	410	9430	3798	21KB544	72	76	28	29	192	0.935	0.44	2.7	10	236	538	261	614	68	68	149
61	FNA0091850061	02/27/22	23	410	9430	3802	21KB544	75	76	26	35	192	0.934	0.44	2.6	10	240	550	246	583	65	67	150
62	FNA0091850062	02/27/22	23	410	9430	3804	21KB544	74	76	26	29	192	0.934	0.44	2.6	10	240	550	246	583	65	67	150
63	FNA0091850063	02/27/22	23	410	9430	3808	21KB544	74	76	26	32	192	0.934	0.44	2.6	10	240	550	246	583	65	67	150
64	FNA0091850064	02/28/22	23	410	9430	3810	21KB544	74	77	30	28	192	0.934	0.44	2.6	10	240	550	246	583	65	67	150
65	FNA0091850065	02/28/22	23	410	9430	3810	21KB544	75	77	29	30	192	0.934	0.44	2.6	10	240	550	246	583	65	67	150
66	FNA0091850066	02/28/22	23	410	9430	3806	21KB544	77	79	29	29	192	0.934	0.44	2.7	10	242	541	249	578	65	67	150
67	FNA0091850067	02/28/22	23	410	9430	3808	21KB544	73	77	29	34	192	0.934	0.44	2.7	10	242	541	249	578	65	67	150
68	FNA0091850068	02/28/22	23	410	9430	3810	21KB544	77	78	29	28	192	0.934	0.44	2.7	10	242	541	249	578	65	67	150
69	FNA0091850069	02/28/22	23	410	9430	3814	21KB544	72	76	30	29	192	0.934	0.44	2.5	10	242	541	249	578	65	67	150
70	FNA0091850070	02/28/22	23	410	9430	3814	21KB544	72	76	31	30	192	0.934	0.44	2.7	10	242	541	249	578	65	67	150
71	FNA0091850071	02/28/22	23	410	9430	3800	21KB544	73	76	30	31	192	0.934	0.44	2.4	10	245	530	267	614	70	66	154
72	FNA0091850072	02/28/22	23	410	9430	3826	21KB544	73	76	31	32	192	0.934	0.44	2.4	10	245	530	267	614	70	66	154
73	FNA0091850073	02/28/22	23	410	9430	3824	21KB544	72	76	32	32	192	0.934	0.44	2.4	10	245	530	267	614	70	66	154
74	FNA0091850074	02/28/22	23	410	9430	3828	21KB544	73	77	30	32	192	0.934	0.44	2.4	10	245	530	267	614	70	66	154

#	Roll Number	Prod. Date	Width (ft)	Length (ft)	Area (sqft)	Weight (lb)	Resin Lot#	ASTM D5994		ASTM D7466		ASTM D8117	ASTM D792	ASTM D1248	ASTM D4218	ASTM D5596	ASTM D6693			ASTM D1004			ASTM D4833
								Thickness-Min	Thickness-Avg	Asperity (top)	Asperity (bottom)	OIT	Density	Melt Flow	Carbon Content	Category 1 Disp.	Tensile Break Str (MD)	Break Elong (MD)	Tensile Break Str (TD)	Break Elong (TD)	Tear Strength (MD)	Tear Strength (TD)	Puncture Resistance
								mil	mil	mil	mil												
75	FNA0091850075	02/28/22	23	410	9430	3836	21KB544	73	76	32	30	192	0.934	0.44	2.4	10	245	530	267	614	70	66	154
76	FNA0091850076	02/28/22	23	410	9430	3836	21KB544	71	76	31	33	192	0.934	0.44	2.6	10	264	557	252	580	70	66	154
77	FNA0091850077	02/28/22	23	410	9430	3836	21KB544	72	76	31	32	192	0.934	0.44	2.6	10	264	557	252	580	70	66	154
78	FNA0091850078	02/28/22	23	410	9430	3832	21KB544	77	78	28	31	192	0.934	0.44	2.6	10	264	557	252	580	70	66	154
79	FNA0091850079	02/28/22	23	410	9430	3840	21KB544	76	77	30	32	192	0.934	0.44	2.6	10	264	557	252	580	70	66	154
80	FNA0091850080	02/28/22	23	410	9430	3850	21KB544	74	78	29	34	192	0.934	0.44	2.6	10	264	557	252	580	70	66	154
81	FNA0091850081	03/01/22	23	410	9430	3852	21KB544	75	79	30	33	192	0.935	0.44	2.3	10	243	544	249	603	66	65	154
82	FNA0091850083	03/01/22	23	410	9430	3826	21KB544	74	77	30	33	192	0.935	0.44	2.3	10	243	544	249	603	66	65	154
83	FNA0091850084	03/01/22	23	410	9430	3828	21KB544	72	76	30	33	192	0.935	0.44	2.3	10	243	544	249	603	66	65	154
84	FNA0091850085	03/01/22	23	410	9430	3830	21KB544	75	79	28	32	192	0.935	0.44	2.7	10	243	544	249	603	66	65	154
85	FNA0091850086	03/01/22	23	410	9430	3824	21KB544	72	78	29	31	192	0.935	0.44	2.3	10	243	544	249	603	66	65	154
86	FNA0091850087	03/01/22	23	410	9430	3834	21KB544	73	79	29	33	192	0.935	0.44	2.4	10	244	533	257	600	66	65	154
87	FNA0091850088	03/01/22	23	410	9430	3828	21KB544	75	78	27	34	192	0.935	0.44	2.4	10	244	533	257	600	66	65	154
88	FNA0091850089	03/01/22	23	410	9430	3822	21KB544	74	79	29	35	192	0.935	0.44	2.4	10	244	533	257	600	66	65	154
89	FNA0091850090	03/01/22	23	410	9430	3824	21KB544	74	79	30	30	192	0.935	0.44	2.4	10	244	533	257	600	66	65	154
90	FNA0091850091	03/01/22	23	410	9430	3820	21KB544	71	77	31	29	192	0.935	0.44	2.4	10	244	533	257	600	66	65	154
91	FNA0091850092	03/01/22	23	410	9430	3822	21KB544	74	78	28	33	192	0.933	0.44	2.4	10	249	535	250	587	70	68	154
92	FNA0091850093	03/01/22	23	410	9430	3818	21KB544	71	79	27	34	192	0.933	0.44	2.4	10	249	535	250	587	70	68	154
93	FNA0091850094	03/01/22	23	410	9430	3816	21KB544	73	79	33	27	192	0.933	0.44	2.4	10	249	535	250	587	70	68	154
94	FNA0091850095	03/01/22	23	410	9430	3832	21KB544	72	77	30	29	192	0.933	0.44	2.2	10	249	535	250	587	70	68	154
95	FNA0091850096	03/01/22	23	410	9430	3834	21KB544	72	77	30	29	192	0.933	0.44	2.4	10	249	535	250	587	70	68	154
96	FNA0091850097	03/01/22	23	410	9430	3822	21KB544	72	77	27	30	192	0.933	0.44	2.5	10	253	531	266	609	70	68	154
97	FNA0091850098	03/02/22	23	410	9430	3830	21KB544	72	77	29	29	192	0.933	0.44	2.5	10	253	531	266	609	70	68	154
98	FNA0091850099	03/02/22	23	410	9430	3828	21KB544	73	77	27	30	192	0.933	0.44	2.5	10	253	531	266	609	70	68	154
99	FNA0091850100	03/02/22	23	410	9430	3832	21KB544	73	78	27	29	192	0.933	0.44	2.7	10	253	531	266	609	70	68	154
100	FNA0091850101	03/02/22	23	410	9430	3830	21KB544	73	77	29	29	192	0.933	0.44	2.5	10	253	531	266	609	70	68	154
101	FNA0091850102	03/02/22	23	410	9430	3814	21KB544	76	79	31	31	192	0.934	0.44	2.5	10	256	546	273	610	72	72	153
102	FNA0091850103	03/02/22	23	410	9430	3844	21KB544	73	76	32	33	192	0.934	0.44	2.5	10	256	546	273	610	72	72	153
103	FNA0091850104	03/02/22	23	410	9430	3834	21KB544	72	76	32	33	192	0.934	0.44	2.5	10	256	546	273	610	72	72	153
104	FNA0091850105	03/02/22	23	410	9430	3836	21KB544	74	79	33	33	192	0.934	0.44	2.6	10	256	546	273	610	72	72	153
105	FNA0091850106	03/02/22	23	410	9430	3828	21KB544	76	80	32	31	192	0.934	0.44	2.5	10	256	546	273	610	72	72	153
106	FNA0091850107	03/02/22	23	410	9430	3832	21KB544	73	76	31	33	192	0.934	0.44	2.4	10	263	603	250	538	72	72	153
107	FNA0091850108	03/02/22	23	410	9430	3832	21KB544	73	77	28	34	192	0.934	0.44	2.4	10	263	603	250	538	72	72	153
108	FNA0091850109	03/02/22	23	410	9430	3828	21KB544	73	76	32	32	192	0.934	0.44	2.4	10	263	603	250	538	72	72	153
109	FNA0091850110	03/02/22	23	410	9430	3832	21KB544	74	76	31	34	192	0.934	0.44	2.5	10	263	603	250	538	72	72	153
110	FNA0091850111	03/02/22	23	410	9430	3832	21KB544	72	77	33	32	192	0.934	0.44	2.4	10	263	603	250	538	72	72	153
111	FNA0091850112	03/02/22	23	410	9430	3852	21KB544	72	78	28	32	192	0.934	0.44	2.6	10	250	536	263	606	73	70	154
112	FNA0091850113	03/02/22	23	410	9430	3850	21KB544	73	78	26	31	192	0.934	0.44	2.6	10	250	536	263	606	73	70	154
113	FNA0091850114	03/02/22	23	410	9430	3850	21KB544	73	77	29	31	192	0.934	0.44	2.6	10	250	536	263	606	73	70	154
114	FNA0091850115	03/03/22	23	410	9430	3850	21KB544	73	77	27	32	192	0.934	0.44	3.4	10	250	536	263	606	73	70	154
115	FNA0091850116	03/03/22	23	410	9430	3850	21KB544	75	78	26	31	192	0.934	0.44	2.6	10	250	536	263	606	73	70	154
116	FNA0091850117	03/03/22	23	410	9430	3837	21KB544	73	77	28	31	192	0.934	0.44	2.5	10	259	547	262	615	73	70	154

#	Roll Number	Prod. Date	Width (ft)	Length (ft)	Area (sqft)	Weight (lb)	Resin Lot#	ASTM D5994		ASTM D7466		ASTM D8117	ASTM D792	ASTM D1248	ASTM D4218	ASTM D5596	ASTM D6693			ASTM D1004		ASTM D4833	
								Thickness-Min	Thickness-Avg	Asperity (top)	Asperity (bottom)	OIT	Density	Melt Flow	Carbon Content	Category 1 Disp.	Tensile Break Str (MD)	Break Elong (MD)	Tensile Break Str (TD)	Break Elong (TD)	Tear Strength (MD)	Tear Strength (TD)	Puncture Resistance
117	FNA0091850118	03/03/22	23	410	9430	3862	21KB544	73	79	33	33	217	0.936	0.34	2.7	10	237	541	252	594	62	63	148
118	FNA0091850119	03/03/22	23	410	9430	3856	21KB544	72	78	32	27	217	0.936	0.34	2.7	10	237	541	252	594	62	63	148

Ryan Steele, Lab Manager

For Questions, Please Contact: Lab Manager, Fernley
 Ryan Steele
 775-835-8282
 Ext 2015



Geomembrane Quality Certification

Customer: Newmont Mining
Project: Cripple Creek
Destination: Cripple Creek, CO
Report Date: 13-Sep-2022 10:12 AM

S.O.# SO00016473
Item Number: FG-LDMSDS080BBBEG
Liner Type: LLDPE DS MicroSpike 80mil Black GM17
Roll Count: 56 (From 1 To 56)

#	Roll Number	Prod. Date	Width (ft)	Length (ft)	Area (sqft)	Weight (lb)	Resin Lot#	ASTM D5994		ASTM D7466		ASTM D8117	ASTM D792	ASTM D1238	ASTM D4218	ASTM D5596	ASTM D6693			ASTM D1004			ASTM D4833
								Thickness-Min	Thickness-Avg	Asperity (top)	Asperity (bottom)	OIT	Density	Melt Flow	Carbon Content	Category 1 Disp.	Tensile Break Str (MD)	Break Elong (MD)	Tensile Break Str (TD)	Break Elong (TD)	Tear Strength (MD)	Tear Strength (TD)	Puncture Resistance
								mil	mil	mil	mil	minut	g/cc	g/10	%	Categ	ppi	%	ppi	%	lb	lb	lb
1	FND0103600003	09/09/22	23	410	9430	3860	DPF811480	77	79	26	31	183	0.933	0.34	2.3	10	270	548	257	617	66	68	154
2	FND0103600004	09/09/22	23	410	9430	3812	DPF811480	77	79	24	32	183	0.933	0.34	2.3	10	270	548	257	617	66	68	154
3	FND0103600005	09/09/22	23	410	9430	3808	DPF811480	77	79	20	30	183	0.933	0.34	2.3	10	270	548	257	617	66	68	154
4	FND0103600006	09/09/22	23	410	9430	3810	DPF811480	75	79	30	29	183	0.933	0.34	2.3	10	270	548	257	617	66	68	154
5	FND0103600007	09/09/22	23	410	9430	3810	DPF811480	75	79	26	31	183	0.933	0.34	2.3	10	270	548	257	617	66	68	154
6	FND0103600008	09/10/22	23	410	9430	3812	DPF811480	74	78	29	28	183	0.933	0.34	2.4	10	273	574	265	613	66	62	154
7	FND0103600009	09/10/22	23	410	9430	3818	DPF811480	74	77	25	36	183	0.933	0.34	2.4	10	273	574	265	613	66	62	154
8	FND0103600010	09/10/22	23	410	9430	3816	DPF811480	77	80	25	26	183	0.933	0.34	2.4	10	273	574	265	613	66	62	154
9	FND0103600011	09/10/22	23	410	9430	3820	DPF811480	75	78	24	28	183	0.933	0.34	2.4	10	273	574	265	613	66	62	154
10	FND0103600012	09/10/22	23	410	9430	3822	DPF811480	75	78	24	27	183	0.933	0.34	2.4	10	273	574	265	613	66	62	154
11	FND0103600013	09/10/22	23	410	9430	3818	DPF811480	77	79	25	33	183	0.933	0.34	2.4	10	261	551	265	609	66	65	160
12	FND0103600014	09/10/22	23	410	9430	3824	DPF811480	76	78	27	31	183	0.933	0.34	2.4	10	261	551	265	609	66	65	160
13	FND0103600015	09/10/22	23	410	9430	3830	DPF811480	76	79	25	27	183	0.933	0.34	2.4	10	261	551	265	609	66	65	160
14	FND0103600016	09/10/22	23	410	9430	3820	DPF811480	77	79	28	28	183	0.933	0.34	2.4	10	261	551	265	609	66	65	160
15	FND0103600017	09/10/22	23	410	9430	3818	DPF811480	76	79	25	29	183	0.933	0.34	2.4	10	261	551	265	609	66	65	160
16	FND0103600018	09/10/22	23	410	9430	3798	DPF811480	77	79	27	27	183	0.933	0.34	2.4	10	262	542	272	631	66	65	160
17	FND0103600019	09/10/22	23	410	9430	3810	DPF811480	74	79	27	27	183	0.933	0.34	2.4	10	262	542	272	631	66	65	160
18	FND0103600020	09/10/22	23	410	9430	3810	DPF811480	77	79	29	27	183	0.933	0.34	2.4	10	262	542	272	631	66	65	160
19	FND0103600021	09/10/22	23	410	9430	3812	DPF811480	76	80	27	34	183	0.933	0.34	2.3	10	262	542	272	631	66	65	160
20	FND0103600022	09/11/22	23	410	9430	3816	DPF811480	77	78	25	32	183	0.933	0.34	2.3	10	262	542	272	631	66	65	160
21	FND0103600023	09/11/22	23	410	9430	3816	DPF811480	76	78	27	30	183	0.934	0.34	2.1	10	269	556	267	613	68	70	158
22	FND0103600024	09/11/22	23	410	9430	3812	DPF811480	76	78	27	30	183	0.934	0.34	2.1	10	269	556	267	613	68	70	158
23	FND0103600025	09/11/22	23	410	9430	3812	DPF811480	76	79	26	27	183	0.934	0.34	2.1	10	269	556	267	613	68	70	158
24	FND0103600026	09/11/22	23	410	9430	3812	DPF811480	76	79	27	29	183	0.934	0.34	2.2	10	269	556	267	613	68	70	158
25	FND0103600027	09/11/22	23	410	9430	3810	DPF811480	76	78	26	30	183	0.934	0.34	2.2	10	269	556	267	613	68	70	158
26	FND0103600028	09/11/22	23	410	9430	3810	DPF811480	77	79	27	29	183	0.934	0.34	2.2	10	262	563	262	605	68	70	158
27	FND0103600029	09/11/22	23	410	9430	3808	DPF811480	76	78	27	28	183	0.934	0.34	2.2	10	262	563	262	605	68	70	158
28	FND0103600030	09/11/22	23	410	9430	3806	DPF811480	75	78	27	29	183	0.934	0.34	2.2	10	262	563	262	605	68	70	158
29	FND0103600031	09/11/22	23	410	9430	3800	DPF811480	78	80	25	30	183	0.934	0.34	2.3	10	262	563	262	605	68	70	158
30	FND0103600032	09/11/22	23	410	9430	3998	DPF811480	74	78	25	28	183	0.934	0.34	2.2	10	262	563	262	605	68	70	158
31	FND0103600033	09/11/22	23	410	9430	3796	DPF811480	75	79	24	24	183	0.934	0.34	2.3	10	263	547	271	620	68	66	159
32	FND0103600034	09/11/22	23	410	9430	3802	DPF811480	75	78	25	26	183	0.934	0.34	2.3	10	263	547	271	620	68	66	159

#	Roll Number	Prod. Date	Width (ft)	Length (ft)	Area (sqft)	Weight (lb)	Resin Lot#	ASTM D5994		ASTM D7466		ASTM D8117	ASTM D792	ASTM D1238	ASTM D4218	ASTM D5596	ASTM D6693			ASTM D1004			ASTM D4833
								Thickness-Min	Thickness-Avg	Asperity (top)	Asperity (bottom)	OIT	Density	Melt Flow	Carbon Content	Category 1 Disp.	Tensile Break Str (MD)	Break Elong (MD)	Tensile Break Str (TD)	Break Elong (TD)	Tear Strength (MD)	Tear Strength (TD)	Puncture Resistance
								mil	mil	mil	mil												
33	FND0103600035	09/11/22	23	410	9430	3798	DPF811480	74	78	26	28	183	0.934	0.34	2.3	10	263	547	271	620	68	66	159
34	FND0103600036	09/11/22	23	410	9430	3808	DPF811480	74	79	28	27	183	0.934	0.34	2.2	10	263	547	271	620	68	66	159
35	FND0103600037	09/12/22	23	410	9430	3812	DPF811480	75	79	26	27	183	0.934	0.34	2.2	10	263	547	271	620	68	66	159
36	FND0103600038	09/12/22	23	410	9430	3816	DPF811480	74	78	29	28	183	0.934	0.34	2.3	10	260	546	265	607	68	66	159
37	FND0103600039	09/12/22	23	410	9430	3812	DPF811480	75	79	25	32	183	0.934	0.34	2.3	10	260	546	265	607	68	66	159
38	FND0103600040	09/12/22	23	410	9430	3820	DPF811480	77	79	26	27	183	0.934	0.34	2.3	10	260	546	265	607	68	66	159
39	FND0103600041	09/12/22	23	410	9430	3820	DPF811480	75	78	27	31	183	0.934	0.34	2.3	10	260	546	265	607	68	66	159
40	FND0103600042	09/12/22	23	410	9430	3822	DPF811480	74	79	25	33	183	0.934	0.34	2.3	10	260	546	265	607	68	66	159
41	FND0103600043	09/12/22	23	410	9430	3818	DPF811480	71	77	29	30	183	0.930	0.34	2.3	10	267	563	273	645	65	65	157
42	FND0103600044	09/12/22	23	410	9430	3822	DPF811480	76	79	25	29	183	0.930	0.34	2.3	10	267	563	273	645	65	65	157
43	FND0103600045	09/12/22	23	410	9430	3818	DPF811480	75	78	26	28	183	0.930	0.34	2.3	10	267	563	273	645	65	65	157
44	FND0103600046	09/12/22	23	410	9430	3808	DPF811480	74	78	26	26	183	0.930	0.34	2.3	10	267	563	273	645	65	65	157
45	FND0103600047	09/12/22	23	410	9430	3808	DPF811480	76	80	27	28	183	0.930	0.34	2.3	10	267	563	273	645	65	65	157
46	FND0103600048	09/12/22	23	410	9430	3806	DPF811480	76	78	29	29	183	0.930	0.34	2.3	10	271	568	251	596	65	65	157
47	FND0103600049	09/12/22	23	410	9430	3812	DPF811480	75	79	25	30	183	0.930	0.34	2.3	10	271	568	251	596	65	65	157
48	FND0103600050	09/12/22	23	410	9430	3808	DPF811480	76	79	28	29	183	0.930	0.34	2.3	10	271	568	251	596	65	65	157
49	FND0103600051	09/12/22	23	410	9430	3816	DPF811480	73	78	27	29	183	0.930	0.34	2.5	10	271	568	251	596	65	65	157
50	FND0103600052	09/13/22	23	410	9430	3820	DPF811480	75	80	26	29	183	0.930	0.34	2.5	10	271	568	251	596	65	65	157
51	FND0103600053	09/13/22	23	410	9430	3822	DPF811480	76	79	26	28	183	0.933	0.34	2.3	10	265	554	267	610	64	65	157
52	FND0103600054	09/13/22	23	410	9430	3822	DPF811480	71	78	27	30	183	0.933	0.34	2.3	10	265	554	267	610	64	65	157
53	FND0103600055	09/13/22	23	410	9430	3848	DPF811480	76	79	26	32	183	0.933	0.34	2.3	10	265	554	267	610	64	65	157
54	FND0103600056	09/13/22	23	410	9430	3826	DPF811480	75	78	26	28	183	0.933	0.34	2.3	10	265	554	267	610	64	65	157
55	FND0103600057	09/13/22	23	410	9430	3822	DPF811480	75	78	28	29	183	0.933	0.34	2.3	10	265	554	267	610	64	65	157
56	FND0103600058	09/13/22	23	410	9430	3824	DPF811480	75	80	26	28	183	0.933	0.34	2.5	10	260	538	272	622	64	65	157



Ryan Steele, Lab Manager

For Questions, Please Contact: Lab Manager, Fernley
 Ryan Steele
 775-835-8282
 Ext 2015



Geomembrane Quality Certification

Customer: Newmont Mining
Project: Cripple Creek
Destination: Cripple Creek, CO
Report Date: 15-Sep-2022 8:31 AM

S.O.# SO00016473
Item Number: FG-LDMSDS080BBBEG
Liner Type: LLDPE DS MicroSpike 80mil Black GM17
Roll Count: 27 (From 57 To 83)

#	Roll Number	Prod. Date	Width (ft)	Length (ft)	Area (sqft)	Weight (lb)	Resin Lot#	ASTM D5994		ASTM D7466		ASTM D8117	ASTM D792	ASTM D1238	ASTM D4218	ASTM D5596	ASTM D6693			ASTM D1004			ASTM D4833
								Thickness-Min	Thickness-Avg	Asperity (top)	Asperity (bottom)	OIT	Density	Melt Flow	Carbon Content	Category 1 Disp.	Tensile Break Str (MD)	Break Elong (MD)	Tensile Break Str (TD)	Break Elong (TD)	Tear Strength (MD)	Tear Strength (TD)	Puncture Resistance
								mil	mil	mil	mil	minut	g/cc	g/10	%	Categ	ppi	%	ppi	%	lb	lb	lb
57	FND0103600059	09/13/22	23	410	9430	3830	DPF811480	76	78	25	32	183	0.933	0.34	2.5	10	260	538	272	622	64	65	157
58	FND0103600060	09/13/22	23	410	9430	3822	DPF811480	75	80	25	29	183	0.933	0.34	2.5	10	260	538	272	622	64	65	157
59	FND0103600061	09/13/22	23	410	9430	3822	DPF811480	76	80	27	31	183	0.933	0.34	2.5	10	260	538	272	622	64	65	157
60	FND0103600062	09/13/22	23	410	9430	3822	DPF811480	75	79	26	32	183	0.933	0.34	2.5	10	260	538	272	622	64	65	157
61	FND0103600063	09/13/22	23	410	9430	3814	DPF811480	76	80	26	30	183	0.932	0.34	2.3	10	269	556	266	596	70	69	160
62	FND0103600064	09/13/22	23	410	9430	3816	DPF811480	73	79	24	30	238	0.930	0.34	2.3	10	269	556	266	596	66	70	160
63	FND0103600065	09/13/22	23	410	9430	3826	DPH810510	76	81	27	32	238	0.930	0.34	2.3	10	269	556	266	596	66	70	160
64	FND0103600066	09/14/22	23	410	9430	3826	DPH810510	74	78	33	30	238	0.930	0.34	2.3	10	269	556	266	596	66	70	160
65	FND0103600067	09/14/22	23	410	9430	3826	DPH810510	75	80	28	37	238	0.930	0.34	2.3	10	269	556	266	596	66	70	160
66	FND0103600068	09/14/22	23	410	9430	3826	DPH810510	75	78	27	33	238	0.930	0.34	2.3	10	266	535	266	614	66	70	160
67	FND0103600069	09/14/22	23	410	9430	3826	DPH810510	76	78	31	29	238	0.930	0.34	2.3	10	266	535	266	614	66	70	160
68	FND0103600070	09/14/22	23	410	9430	3826	DPH810510	74	80	31	29	238	0.930	0.34	2.3	10	266	535	266	614	66	70	160
69	FND0103600071	09/14/22	23	410	9430	3826	DPH810510	76	79	34	28	238	0.930	0.34	2.3	10	266	535	266	614	66	70	160
70	FND0103600072	09/14/22	23	410	9430	3830	DPH810510	73	78	26	32	238	0.930	0.34	2.3	10	266	535	266	614	66	70	160
71	FND0103600073	09/14/22	23	410	9430	3832	DPH810510	76	79	25	28	238	0.933	0.34	2.4	10	289	556	277	631	67	62	157
72	FND0103600074	09/14/22	23	410	9430	3826	DPF811480	73	78	28	35	238	0.933	0.34	2.4	10	289	556	277	631	67	62	157
73	FND0103600075	09/14/22	23	410	9430	3824	DPF811480	77	80	25	28	238	0.933	0.34	2.4	10	289	556	277	631	67	62	157
74	FND0103600076	09/14/22	23	410	9430	3822	DPF811480	74	78	26	32	238	0.933	0.34	2.3	10	289	556	277	631	67	62	157
75	FND0103600077	09/14/22	23	410	9430	3816	DPF811480	75	79	25	32	238	0.933	0.34	2.4	10	289	556	277	631	67	62	157
76	FND0103600078	09/14/22	23	410	9430	3808	DPF811350	74	79	28	31	238	0.933	0.34	2.5	10	288	553	281	612	67	62	157
77	FND0103600079	09/14/22	23	410	9430	3818	DPF811350	72	77	30	34	238	0.933	0.34	2.5	10	288	553	281	612	67	62	157
78	FND0103600080	09/14/22	23	410	9430	3824	DPF811350	76	79	27	37	238	0.933	0.34	2.5	10	288	553	281	612	67	62	157
79	FND0103600081	09/15/22	23	410	9430	3828	DPF811350	77	79	28	39	238	0.933	0.34	2.2	10	288	553	281	612	67	62	157
80	FND0103600082	09/15/22	23	410	9430	3830	DPF811350	74	79	34	32	238	0.933	0.34	2.2	10	288	553	281	612	67	62	157
81	FND0103600083	09/15/22	23	410	9430	3832	DPF811350	75	79	28	39	238	0.934	0.34	2.4	10	272	543	279	614	75	71	156
82	FND0103600084	09/15/22	23	410	9430	3832	DPF811350	74	77	29	39	238	0.934	0.34	2.4	10	272	543	279	614	75	71	156
83	FND0103600085	09/15/22	23	410	9430	3836	DPF811350	77	80	33	39	238	0.934	0.34	2.4	10	272	543	279	614	75	71	156

Ryan Steele, Lab Manager

Ryan Steele
775-835-8282
Ext 2015



Geomembrane Quality Certification



ACCEPTANCE IS FOR GENERAL COMPLIANCE WITH THE CONTRACT DOCUMENTS ONLY. THE CONTRACTOR IS RESPONSIBLE FOR CONFIRMING AND CORRELATING ALL QUANTITIES AND DIMENSIONS; SELECTING FABRICATION PROCESS AND TECHNIQUES FOR CONSTRUCTION; COORDINATING ITS WORK WITH THAT OF ALL OTHER TRADES; AND PERFORMING ITS WORK IN A SAFE AND SATISFACTORY MANNER.



APPROVED

REVISE AND RESUBMIT



APPROVED WITH CHANGES NOTED

REJECTED

DATE: Sep 23, 2022 BY: Nikoliya L Boyanich

Customer: Newmont Mining
Project: Cripple Creek
Destination: Cripple Creek, CO
Report Date: 21-Sep-2022 11:44 AM

S.O.# SO00016473
Item Number: FG-LDMSDS080BBBEG
Liner Type: LLDPE DS MicroSpike 80mil Black GM17
Roll Count: 45 (From 84 To 128)

#	Roll Number	Prod. Date	Width (ft)	Length (ft)	Area (sqft)	Weight (lb)	Resin Lot#	ASTM D5994		ASTM D7466		ASTM D8117	ASTM D792	ASTM D1238	ASTM D4218	ASTM D5596	ASTM D6693			ASTM D1004			ASTM D4833
								Thickness-Min	Thickness-Avg	Asperity (top)	Asperity (bottom)	OIT	Density	Melt Flow	Carbon Content	Category 1 Disp.	Tensile Break Str (MD)	Break Elong (MD)	Tensile Break Str (TD)	Break Elong (TD)	Tear Strength (MD)	Tear Strength (TD)	Puncture Resistance
								mil	mil	mil	mil	minut	g/cc	g/10	%	Categ	ppi	%	ppi	%	lb	lb	lb
84	FND0103600087	09/15/22	23	410	9430	3832	DPF811350	74	77	27	29	187	0.934	0.38	2.3	10	272	559	266	625	69	67	157
85	FND0103600088	09/15/22	23	410	9430	3826	DPF811350	75	79	27	30	187	0.934	0.38	2.3	10	272	559	266	625	69	67	157
86	FND0103600089	09/15/22	23	410	9430	3830	DPF811350	71	77	27	30	187	0.934	0.38	2.3	10	272	559	266	625	69	67	157
87	FND0103600090	09/15/22	23	410	9430	3824	DPF811350	76	80	26	35	187	0.934	0.38	2.1	10	272	559	266	625	69	67	157
88	FND0103600091	09/16/22	23	410	9430	3830	DPF811350	74	78	27	36	187	0.934	0.38	2.1	10	272	559	266	625	69	67	157
89	FND0103600092	09/16/22	23	410	9430	3818	DPF811350	73	78	26	30	187	0.934	0.38	2.4	10	275	548	273	600	69	67	157
90	FND0103600093	09/16/22	23	410	9430	3826	DPF811350	71	79	29	35	187	0.934	0.38	2.4	10	275	548	273	600	69	67	157
91	FND0103600094	09/16/22	23	410	9430	3812	DPF811350	76	78	27	33	187	0.934	0.38	2.4	10	275	548	273	600	69	67	157
92	FND0103600095	09/16/22	23	410	9430	3826	DPH810510	76	81	23	35	187	0.934	0.38	2.1	10	275	548	273	600	69	67	157
93	FND0103600096	09/16/22	23	410	9430	3816	DPH810510	76	78	28	31	187	0.934	0.38	2.1	10	275	548	273	600	69	67	157
94	FND0103600097	09/16/22	23	410	9430	3828	DPH810510	74	77	27	32	238	0.934	0.34	2.1	10	267	546	282	629	67	64	155
95	FND0103600098	09/16/22	23	410	9430	3826	DPH810510	76	79	24	29	238	0.934	0.34	2.1	10	267	546	282	629	67	64	155
96	FND0103600099	09/16/22	23	410	9430	3828	DPH810510	77	79	27	28	238	0.934	0.34	2.1	10	267	546	282	629	67	64	155
97	FND0103600100	09/16/22	23	410	9430	3820	DPH810510	74	80	29	30	238	0.934	0.34	2.2	10	267	546	282	629	67	64	155
98	FND0103600101	09/16/22	23	410	9430	3872	DPH810510	74	78	27	36	238	0.934	0.34	2.1	10	267	546	282	629	67	64	155
99	FND0103600102	09/16/22	23	410	9430	3868	DPH810510	76	80	28	29	238	0.934	0.34	2.2	10	287	570	282	629	67	64	155
100	FND0103600103	09/16/22	23	410	9430	3870	DPH810510	75	79	27	32	238	0.934	0.34	2.2	10	287	570	282	629	67	64	155
101	FND0103600106	09/17/22	23	410	9430	3850	DPH810510	75	80	27	29	238	0.934	0.34	2.2	10	287	570	282	629	67	64	155
102	FND0103600107	09/17/22	23	410	9430	3848	DPH810510	76	79	25	29	238	0.934	0.34	2.4	10	287	570	282	629	67	64	155
103	FND0103600108	09/17/22	23	410	9430	3856	DPH810510	75	80	26	29	238	0.934	0.34	2.4	10	287	570	282	629	67	64	155
104	FND0103600109	09/17/22	23	410	9430	3850	DPH810510	77	80	26	28	238	0.931	0.34	2.2	10	258	546	264	606	64	63	156
105	FND0103600110	09/17/22	23	410	9430	3852	DPH810510	77	80	26	27	238	0.931	0.34	2.2	10	258	546	264	606	64	63	156
106	FND0103600111	09/17/22	23	410	9430	3848	DPH810510	75	80	29	28	238	0.931	0.34	2.2	10	258	546	264	606	64	63	156
107	FND0103600112	09/17/22	23	410	9430	3858	DPH810510	77	78	28	35	238	0.931	0.34	2.3	10	258	546	264	606	64	63	156
108	FND0103600114	09/17/22	23	410	9430	3858	DPH810510	78	81	27	35	238	0.931	0.34	2.2	10	258	546	264	606	64	63	156
109	FND0103600115	09/17/22	23	410	9430	3864	DPH810510	76	79	26	33	238	0.931	0.34	2.2	10	269	572	253	616	64	63	156
110	FND0103600116	09/17/22	23	410	9430	3854	DPH810510	77	81	26	35	238	0.931	0.34	2.2	10	269	572	253	616	64	63	156
111	FND0103600117	09/17/22	23	410	9430	3858	DPH810510	77	80	28	31	238	0.931	0.34	2.2	10	269	572	253	616	64	63	156
112	FND0103600118	09/17/22	23	410	9430	3892	DPH810510	78	82	27	33	238	0.931	0.34	2.3	10	269	572	253	616	64	63	156
113	FND0103600119	09/17/22	23	410	9430	3834	DPH810510	76	80	27	31	238	0.931	0.34	2.2	10	269	572	253	616	64	63	156
114	FND0103600120	09/17/22	23	410	9430	3840	DPH810510	76	78	26	29	238	0.932	0.34	2.4	10	270	559	265	618	67	61	155
115	FND0103600121	09/18/22	23	410	9430	3842	DPH810510	75	79	26	28	238	0.932	0.34	2.4	10	270	559	265	618	67	61	155

#	Roll Number	Prod. Date	Width (ft)	Length (ft)	Area (sqft)	Weight (lb)	Resin Lot#	ASTM D5994				ASTM D7466				ASTM D8117	ASTM D792	ASTM D1238	ASTM D4218	ASTM D5596	ASTM D6693				ASTM D1004			ASTM D4833
								Thickness-Min	Thickness-Avg	Asperity (top)	Asperity (bottom)	OIT	Density	Melt Flow	Carbon Content	Category 1 Disp.	Tensile Break Str (MD)	Break Elong (MD)	Tensile Break Str (TD)	Break Elong (TD)	Tear Strength (MD)	Tear Strength (TD)	Puncture Resistance					
mil	mil	mil	mil	minut	g/cc	g/10	%	Categ	ppi	%	ppi	%	lb	lb	lb													
116	FND0103600122	09/18/22	23	410	9430	3840	DPH810510	77	79	28	27	238	0.932	0.34	2.4	10	270	559	265	618	67	61	155					
117	FND0103600123	09/18/22	23	410	9430	3838	DPH810510	75	79	27	29	238	0.932	0.34	2.4	10	270	559	265	618	67	61	155					
118	FND0103600124	09/18/22	23	410	9430	3844	DPH810510	73	79	26	29	238	0.932	0.34	2.4	10	270	559	265	618	67	61	155					
119	FND0103600125	09/18/22	23	410	9430	3844	DPH810510	75	79	27	29	238	0.932	0.34	2.1	10	256	550	249	599	67	61	155					
120	FND0103600126	09/18/22	23	410	9430	3834	DPH810510	77	79	27	28	238	0.932	0.34	2.1	10	256	550	249	599	67	61	155					
121	FND0103600127	09/18/22	23	410	9430	3842	DPH810510	75	80	27	34	238	0.932	0.34	2.1	10	256	550	249	599	67	61	155					
122	FND0103600128	09/18/22	23	410	9430	3836	DPH810510	74	78	27	31	238	0.932	0.34	2.2	10	256	550	249	599	67	61	155					
123	FND0103600129	09/18/22	23	410	9430	3842	DPH810510	75	78	27	32	238	0.932	0.34	2.1	10	256	550	249	599	67	61	155					
124	FND0103600130	09/18/22	23	410	9430	3840	DPH810510	76	78	25	31	238	0.933	0.34	2.3	10	241	551	257	627	66	64	153					
125	FND0103600131	09/18/22	23	410	9430	3834	DPH810510	76	79	25	30	238	0.933	0.34	2.3	10	241	551	257	627	66	64	153					
126	FND0103600132	09/18/22	23	410	9430	3832	DPH810510	77	78	30	30	238	0.933	0.34	2.3	10	241	551	257	627	66	64	153					
127	FND0103600133	09/18/22	23	410	9430	3840	DPH810510	76	78	26	31	238	0.933	0.34	2.3	10	241	551	257	627	66	64	153					
128	FND0103600134	09/18/22	23	410	9430	3840	DPH810510	74	79	29	33	238	0.933	0.34	2.3	10	241	551	257	627	66	64	153					

Ryan Steele

Ryan Steele, Lab Manager

For Questions, Please Contact: Lab Manager, Fernley
Ryan Steele
775-835-8282
Ext 2015



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☐ APPROVED
☐ REVISE AND RESUBMIT

☐ APPROVED WITH CHANGES NOTED
☐ REJECTED

DATE: Sep 23, 2022 BY: Nikoliva L. Boyanich



Geomembrane Quality Certification

Customer: Newmont Mining
Project: Cripple Creek
Destination: Cripple Creek, CO
Report Date: 21-Sep-2022 1:02 PM

S.O.# SO00016473
Item Number: FG-LDMSDS080BBEG
Liner Type: LLDPE DS MicroSpike 80mil Black GM17
Roll Count: 36 (From 129 To 164)

ACCEPTANCE IS FOR GENERAL COMPLIANCE WITH THE CONTRACT DOCUMENTS ONLY. THE CONTRACTOR IS RESPONSIBLE FOR CONFIRMING AND CORRELATING ALL QUANTITIES AND DIMENSIONS; SELECTING FABRICATION PROCESS AND TECHNIQUES FOR CONSTRUCTION; COORDINATING ITS WORK WITH THAT OF ALL OTHER TRADES; AND PERFORMING ITS WORK IN A SAFE AND SATISFACTORY MANNER.

APPROVED

REVISE AND RESUBMIT

APPROVED WITH CHANGES NOTED

REJECTED

DATE: Sep 23, 2022 BY: Nikoliya L. Boyanich

#	Roll Number	Prod. Date	Width (ft)	Length (ft)	Area (sqft)	Weight (lb)	Resin Lot#	ASTM D5994		ASTM D7466		ASTM D8117	ASTM D792	ASTM D1238	ASTM D4218	ASTM D5596	ASTM D6693			ASTM D1004			ASTM D4833
								Thickness-Min	Thickness-Avg	Asperity (top)	Asperity (bottom)	OIT	Density	Melt Flow	Carbon Content	Category 1 Disp.	Tensile Break Str (MD)	Break Elong (MD)	Tensile Break Str (TD)	Break Elong (TD)	Tear Strength (MD)	Tear Strength (TD)	Puncture Resistance
								mil	mil	mil	mil	minut	g/cc	g/10	%	Categ	ppi	%	ppi	%	lb	lb	lb
129	FND0103600135	09/19/22	23	410	9430	3834	DPH810510	75	80	26	34	238	0.933	0.34	2.2	10	278	555	259	631	66	64	153
130	FND0103600136	09/19/22	23	410	9430	3840	DPH810510	76	79	32	30	238	0.933	0.34	2.2	10	278	555	259	631	66	64	153
131	FND0103600137	09/19/22	23	410	9430	3834	DPH810510	75	78	26	33	238	0.933	0.34	2.2	10	278	555	259	631	66	64	153
132	FND0103600138	09/19/22	23	410	9430	3840	DPH810510	77	80	24	32	238	0.933	0.34	2.3	10	278	555	259	631	66	64	153
133	FND0103600139	09/19/22	23	410	9430	3838	DPH810510	76	80	26	34	238	0.933	0.34	2.2	10	278	555	259	631	66	64	153
134	FND0103600140	09/19/22	23	410	9430	3832	DPH810510	74	79	26	34	238	0.933	0.34	2.5	10	275	549	263	615	74	74	154
135	FND0103600141	09/19/22	23	410	9430	3842	DPH810510	77	80	24	33	238	0.933	0.34	2.5	10	275	549	263	615	74	74	154
136	FND0103600142	09/19/22	23	410	9430	3826	DPH810510	76	78	26	28	238	0.933	0.34	2.5	10	275	549	263	615	74	74	154
137	FND0103600143	09/19/22	23	410	9430	3836	DPH810510	76	79	25	35	238	0.933	0.34	2.1	10	275	549	263	615	74	74	154
138	FND0103600144	09/19/22	23	410	9430	3832	DPH810510	77	80	26	31	238	0.933	0.34	2.5	10	275	549	263	615	74	74	154
139	FND0103600145	09/19/22	23	410	9430	3834	DPH810510	75	78	26	33	238	0.933	0.34	2.3	10	274	540	278	635	66	64	153
140	FND0103600146	09/19/22	23	410	9430	3834	DPH810510	76	78	26	33	238	0.933	0.34	2.3	10	274	540	278	635	66	64	153
141	FND0103600147	09/19/22	23	410	9430	3834	DPH810510	75	79	26	33	238	0.933	0.34	2.3	10	274	540	278	635	66	64	153
142	FND0103600148	09/19/22	23	410	9430	3836	DPH810510	76	80	26	33	238	0.933	0.34	2.3	10	274	540	278	635	66	64	153
143	FND0103600149	09/19/22	23	410	9430	3836	DPH810510	75	80	26	33	238	0.933	0.34	2.3	10	274	540	278	635	66	64	153
144	FND0103600150	09/20/22	23	410	9430	3840	DPH810510	75	80	24	34	238	0.931	0.34	2.4	10	258	624	254	550	65	66	155
145	FND0103600151	09/20/22	23	410	9430	3838	DPH810510	76	81	25	32	238	0.931	0.34	2.4	10	258	624	254	550	65	66	155
146	FND0103600152	09/20/22	23	410	9430	3840	DPH810510	77	82	25	33	238	0.931	0.34	2.4	10	258	624	254	550	65	66	155
147	FND0103600153	09/20/22	23	410	9430	3832	DPH810510	75	79	25	33	238	0.931	0.34	2.4	10	258	624	254	550	65	66	155
148	FND0103600154	09/20/22	23	410	9430	3836	DPH810510	75	79	25	31	238	0.931	0.34	2.4	10	258	624	254	550	65	66	155
149	FND0103600155	09/20/22	23	410	9430	3832	DPH810510	73	78	28	30	238	0.931	0.34	2.2	10	243	537	260	624	65	66	155
150	FND0103600156	09/20/22	23	410	9430	3836	DPH810510	76	78	29	29	238	0.931	0.34	2.2	10	243	537	260	624	65	66	155
151	FND0103600157	09/20/22	23	410	9430	3816	DPH810510	76	79	26	31	238	0.931	0.34	2.2	10	243	537	260	624	65	66	155
152	FND0103600158	09/20/22	23	410	9430	3822	DPH810510	74	77	27	29	238	0.931	0.34	2.3	10	243	537	260	624	65	66	155
153	FND0103600159	09/20/22	23	410	9430	3842	DPH810510	72	77	27	30	238	0.931	0.34	2.2	10	243	537	260	624	65	66	155
154	FND0103600160	09/20/22	23	410	9430	3854	DPH810510	75	77	27	27	238	0.933	0.34	2.3	10	241	528	255	615	68	66	155
155	FND0103600161	09/20/22	23	410	9430	3852	DPH810510	75	77	27	29	238	0.933	0.34	2.3	10	241	528	255	615	68	66	155
156	FND0103600162	09/20/22	23	410	9430	3860	DPH810510	74	77	28	30	238	0.933	0.34	2.3	10	241	528	255	615	68	66	155
157	FND0103600163	09/20/22	23	410	9430	3848	DPH810510	75	78	28	28	238	0.933	0.34	2.2	10	241	528	255	615	68	66	155
158	FND0103600164	09/21/22	23	410	9430	3850	DPH810510	75	79	27	27	238	0.933	0.34	2.2	10	241	528	255	615	68	66	155
159	FND0103600165	09/21/22	23	410	9430	3860	DPH810510	76	79	25	29	238	0.933	0.34	2.1	10	243	541	246	588	68	66	155
160	FND0103600166	09/21/22	23	410	9430	3872	DPH810510	77	79	28	27	238	0.933	0.34	2.1	10	243	541	246	588	68	66	155

#	Roll Number	Prod. Date	Width (ft)	Length (ft)	Area (sqft)	Weight (lb)	Resin Lot#	ASTM D5994		ASTM D7466		ASTM D8117	ASTM D792	ASTM D1238	ASTM D4218	ASTM D5596	ASTM D6693			ASTM D1004		ASTM D4833	
								Thickness-Min	Thickness-Avg	Asperity (top)	Asperity (bottom)	OIT	Density	Melt Flow	Carbon Content	Category 1 Disp.	Tensile Break Str (MD)	Break Elong (MD)	Tensile Break Str (TD)	Break Elong (TD)	Tear Strength (MD)	Tear Strength (TD)	Puncture Resistance
161	FND0103600167	09/21/22	23	410	9430	3864	DPH810510	75	77	28	27	238	0.933	0.34	2.1	10	243	541	246	588	68	66	155
162	FND0103600168	09/21/22	23	410	9430	3870	DPH810510	76	78	28	26	238	0.933	0.34	2.1	10	243	541	246	588	68	66	155
163	FND0103600169	09/21/22	23	410	9430	3872	DPH810510	76	78	25	26	238	0.933	0.34	2.1	10	243	541	246	588	68	66	155
164	FND0103600170	09/21/22	23	410	9430	3868	DPH810510	78	81	25	28	238	0.931	0.34	2.2	10	244	533	238	571	67	61	156

Ryan Steele

Ryan Steele, Lab Manager

For Questions, Please Contact: Lab Manager, Fernley
Ryan Steele
775-835-8282
Ext 2015



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☒ APPROVED
☐ REVISE AND RESUBMIT

☐ APPROVED WITH CHANGES NOTED
☐ REJECTED

DATE: Sep 23, 2022 BY: Nikoliya L. Bovanich



Geomembrane Quality Certification

Customer: Newmont Mining
Project: Cripple Creek
Destination: Cripple Creek, CO
Report Date: 26-Sep-2022 10:56 AM

S.O.# SO00016473
Item Number: FG-LDMSDS080BBBEG
Liner Type: LLDPE DS MicroSpike 80mil Black GM17
Roll Count: 66 (From 165 To 230)



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☐ APPROVED
☐ REVISE AND RESUBMIT

☐ APPROVED WITH CHANGES NOTED
☐ REJECTED

DATE: Sep 28, 2022 BY: Nikoliya L. Boyanich

#	Roll Number	Prod. Date	Width (ft)	Length (ft)	Area (sqft)	Weight (lb)	Resin Lot#	ASTM D5994		ASTM D7466		ASTM D8117	ASTM D792	ASTM D1238	ASTM D4218	ASTM D5596	ASTM D6693			ASTM D1004			ASTM D4833
								Thickness-Avg	Thickness-Min	Asperity (bottom)	Asperity (top)	OIT	Density	Melt Flow	Carbon Content	Category 1 Disp.	Break Elong (MD)	Break Elong (TD)	Tensile Break Str (MD)	Tensile Break Str (TD)	Tear Strength (TD)	Tear Strength (MD)	Puncture Resistance
								mil	mil	mil	mil	minut	g/cc	g/10	%	Categ	%	%	ppi	ppi	lb	lb	lb
165	FND0103600171	09/21/22	23	410	9430	3868	DPH810510	78	73	32	27	238	0.931	0.34	2.2	10	533	571	244	238	61	67	156
166	FND0103600173	09/21/22	23	410	9430	3872	DPH810510	79	75	29	27	238	0.931	0.34	2.2	10	533	571	244	238	61	67	156
167	FND0103600174	09/21/22	23	410	9430	3874	DPH810510	78	75	30	27	238	0.931	0.34	2.3	10	533	571	244	238	61	67	156
168	FND0103600175	09/21/22	23	410	9430	3866	DPH810510	78	76	28	26	238	0.931	0.34	2.2	10	533	571	244	238	61	67	156
169	FND0103600176	09/21/22	23	410	9430	3872	DPH810510	77	74	31	27	238	0.931	0.34	2.4	10	557	632	262	279	61	67	156
170	FND0103600177	09/21/22	23	410	9430	3870	DPH810510	79	75	30	27	238	0.931	0.34	2.4	10	557	632	262	279	61	67	156
171	FND0103600178	09/21/22	23	410	9430	3848	DPH810510	77	75	33	27	238	0.931	0.34	2.4	10	557	632	262	279	61	67	156
172	FND0103600179	09/22/22	23	410	9430	3868	DPH810510	79	75	30	25	238	0.931	0.34	2.3	10	557	632	262	279	61	67	156
173	FND0103600180	09/22/22	23	410	9430	3868	DPH810510	79	76	33	27	238	0.931	0.34	2.2	10	557	632	262	279	61	67	156
174	FND0103600181	09/22/22	23	410	9430	3850	DPH810510	79	74	32	24	238	0.931	0.34	2.4	10	533	604	244	247	69	70	156
175	FND0103600182	09/22/22	23	410	9430	3866	DPH810510	78	75	28	29	238	0.931	0.34	2.4	10	533	604	244	247	69	70	156
176	FND0103600183	09/22/22	23	410	9430	3864	DPH810510	78	74	31	25	238	0.931	0.34	2.4	10	533	604	244	247	69	70	156
177	FND0103600184	09/22/22	23	410	9430	3874	DPH810510	78	75	29	26	238	0.931	0.34	2.2	10	533	604	244	247	69	70	156
178	FND0103600185	09/22/22	23	410	9430	3878	DPH810510	79	76	29	27	238	0.931	0.34	2.4	10	533	604	244	247	69	70	156
179	FND0103600186	09/22/22	23	410	9430	3878	DPH810510	79	76	34	28	238	0.931	0.34	2.2	10	631	597	259	275	61	67	156
180	FND0103600187	09/22/22	23	410	9430	3878	DPH810510	79	75	32	26	238	0.931	0.34	2.2	10	631	597	259	275	61	67	156
181	FND0103600188	09/22/22	23	410	9430	3894	DPH810490	79	77	34	28	208	0.935	0.31	2.2	10	631	597	259	275	61	67	156
182	FND0103600189	09/22/22	23	410	9430	3862	DPH810490	80	77	33	27	208	0.935	0.31	2.2	10	631	597	259	275	61	67	156
183	FND0103600190	09/22/22	23	410	9430	3828	DPH810490	77	74	33	28	208	0.935	0.31	2.2	10	631	597	259	275	61	67	156
184	FND0103600191	09/22/22	23	410	9430	3830	DPH810490	78	75	33	26	208	0.933	0.31	2.2	10	530	579	242	232	63	67	155
185	FND0103600192	09/22/22	23	410	9430	3826	DPH810490	79	74	32	28	208	0.933	0.31	2.2	10	530	579	242	232	63	67	155
186	FND0103600193	09/22/22	23	410	9430	3836	DPH810490	78	72	31	25	208	0.933	0.31	2.2	10	530	579	242	232	63	67	155
187	FND0103600194	09/23/22	23	410	9430	3840	DPH810490	79	75	30	25	208	0.933	0.31	2.3	10	530	579	242	232	63	67	155
188	FND0103600195	09/23/22	23	410	9430	3842	DPH810490	78	71	29	27	208	0.933	0.31	2.3	10	530	579	242	232	63	67	155
189	FND0103600196	09/23/22	23	410	9430	3836	DPH810490	80	75	33	23	208	0.933	0.31	2.6	10	587	548	242	239	63	67	155
190	FND0103600197	09/23/22	23	410	9430	3838	DPH810490	79	73	33	23	208	0.933	0.31	2.6	10	587	548	242	239	63	67	155
191	FND0103600198	09/23/22	23	410	9430	3840	DPH810490	78	74	32	24	208	0.933	0.31	2.6	10	587	548	242	239	63	67	155
192	FND0103600199	09/23/22	23	410	9430	3838	DPH810490	79	75	29	31	208	0.933	0.31	2.3	10	587	548	242	239	63	67	155
193	FND0103600200	09/23/22	23	410	9430	3850	DPH810490	77	75	36	25	208	0.933	0.31	2.6	10	587	548	242	239	63	67	155
194	FND0103600201	09/23/22	23	410	9430	3824	DPH810490	78	76	33	27	208	0.934	0.31	2.3	10	565	581	263	246	69	70	157
195	FND0103600202	09/23/22	23	410	9430	3824	DPH810490	77	76	33	28	208	0.934	0.31	2.3	10	565	581	263	246	69	70	157
196	FND0103600203	09/23/22	23	410	9430	3822	DPH810490	77	75	33	25	208	0.934	0.31	2.3	10	565	581	263	246	69	70	157

#	Roll Number	Prod. Date	Width (ft)	Length (ft)	Area (sqft)	Weight (lb)	Resin Lot#	ASTM D5994		ASTM D7466		ASTM D8117	ASTM D792	ASTM D1238	ASTM D4218	ASTM D5596	ASTM D6693			ASTM D1004		ASTM D4833	
								Thickness-Avg	Thickness-Min	Asperity (bottom)	Asperity (top)	OIT	Density	Melt Flow	Carbon Content	Category 1 Disp.	Break Elong (MD)	Break Elong (TD)	Tensile Break Str (MD)	Tensile Break Str (TD)	Tear Strength (TD)	Tear Strength (MD)	Puncture Resistance
197	FND0103600204	09/23/22	23	410	9430	3824	DPH810490	78	75	35	26	208	0.934	0.31	2.3	10	565	581	263	246	69	70	157
198	FND0103600205	09/23/22	23	410	9430	3822	DPH810490	77	74	35	26	208	0.934	0.31	2.3	10	565	581	263	246	69	70	157
199	FND0103600206	09/23/22	23	410	9430	3824	DPH810490	77	75	33	27	208	0.934	0.31	2.5	10	532	558	247	236	69	70	157
200	FND0103600207	09/23/22	23	410	9430	3822	DPH810490	78	75	29	25	208	0.934	0.31	2.5	10	532	558	247	236	69	70	157
201	FND0103600208	09/23/22	23	410	9430	3824	DPH810490	78	73	34	28	208	0.934	0.31	2.1	10	532	558	247	236	69	70	157
202	FND0103600209	09/24/22	23	410	9430	3826	DPH810490	78	75	32	27	208	0.934	0.31	2.1	10	532	558	247	236	69	70	157
203	FND0103600210	09/24/22	23	410	9430	3822	DPH810490	78	77	33	27	208	0.934	0.31	2.5	10	532	558	247	236	69	70	157
204	FND0103600211	09/24/22	23	410	9430	3826	DPH810490	79	75	32	26	208	0.936	0.31	2.4	10	531	606	245	255	67	66	157
205	FND0103600212	09/24/22	23	410	9430	3828	DPH810490	78	76	33	32	208	0.936	0.31	2.4	10	531	606	245	255	67	66	157
206	FND0103600213	09/24/22	23	410	9430	3830	DPH810490	79	76	39	26	208	0.936	0.31	2.4	10	531	606	245	255	67	66	157
207	FND0103600214	09/24/22	23	410	9430	3824	DPH810490	78	76	32	28	208	0.936	0.31	2.4	10	531	606	245	255	67	66	157
208	FND0103600215	09/24/22	23	410	9430	3830	DPH810490	77	75	35	26	208	0.936	0.31	2.4	10	531	606	245	255	67	66	157
209	FND0103600216	09/24/22	23	410	9430	3822	DPH810490	78	77	35	27	208	0.936	0.31	2.2	10	550	596	253	249	67	66	157
210	FND0103600217	09/24/22	23	410	9430	3822	DPH810490	77	74	36	25	208	0.936	0.31	2.2	10	550	596	253	249	67	66	157
211	FND0103600218	09/24/22	23	410	9430	3806	DPH810490	78	77	35	26	208	0.936	0.31	2.2	10	550	596	253	249	67	66	157
212	FND0103600219	09/24/22	23	410	9430	3816	DPH810490	77	75	34	26	208	0.936	0.31	2.0	10	550	596	253	249	67	66	157
213	FND0103600220	09/24/22	23	410	9430	3818	DPH810490	78	76	34	26	208	0.936	0.31	2.2	10	550	596	253	249	67	66	157
214	FND0103600222	09/24/22	23	410	9430	3822	DPH810490	79	75	32	26	208	0.934	0.31	2.2	10	557	575	261	243	64	68	157
215	FND0103600223	09/25/22	23	410	9430	3814	DPH810490	77	73	29	30	208	0.934	0.31	2.2	10	557	575	261	243	64	68	157
216	FND0103600224	09/25/22	23	410	9430	3824	DPH810490	79	75	26	30	208	0.934	0.31	2.2	10	557	575	261	243	64	68	157
217	FND0103600225	09/25/22	23	410	9430	3818	DPH810490	77	74	30	30	208	0.934	0.31	2.2	10	557	575	261	243	64	68	157
218	FND0103600226	09/25/22	23	410	9430	3822	DPH810490	78	76	25	28	208	0.934	0.31	2.2	10	557	575	261	243	64	68	157
219	FND0103600227	09/25/22	23	410	9430	3822	DPH810490	78	72	28	28	208	0.934	0.31	2.3	10	525	563	233	239	64	68	157
220	FND0103600228	09/25/22	23	410	9430	3826	DPH810490	77	75	30	27	208	0.934	0.31	2.3	10	525	563	233	239	64	68	157
221	FND0103600229	09/25/22	23	410	9430	3822	DPH810490	78	77	33	27	208	0.934	0.31	2.3	10	525	563	233	239	64	68	157
222	FND0103600230	09/25/22	23	410	9430	3824	DPH810490	77	74	33	26	208	0.934	0.31	2.4	10	525	563	233	239	64	68	157
223	FND0103600231	09/25/22	23	410	9430	3822	DPH810490	78	75	33	26	208	0.934	0.31	2.3	10	525	563	233	239	64	68	157
224	FND0103600232	09/25/22	23	410	9430	3824	DPH810490	78	74	33	26	208	0.935	0.31	2.5	10	561	583	259	240	68	68	154
225	FND0103600233	09/25/22	23	410	9430	3810	DPH810490	77	73	34	27	208	0.935	0.31	2.5	10	561	583	259	240	68	68	154
226	FND0103600234	09/25/22	23	410	9430	3800	DPH810490	78	75	33	26	208	0.935	0.31	2.5	10	561	583	259	240	68	68	154
227	FND0103600235	09/25/22	23	410	9430	3808	DPH810490	78	76	32	28	208	0.935	0.31	2.4	10	561	583	259	240	68	68	154
228	FND0103600236	09/25/22	23	410	9430	3800	DPH810490	77	75	31	25	208	0.935	0.31	2.4	10	561	583	259	240	68	68	154
229	FND0103600237	09/25/22	23	410	9430	3826	DPH810490	79	77	29	29	208	0.935	0.31	2.5	10	560	606	254	258	68	68	154
230	FND0103600238	09/26/22	23	410	9430	3824	DPH810490	78	72	28	28	208	0.935	0.31	2.5	10	560	606	254	258	68	68	154

Ryan Steele

Ryan Steele, Lab Manager

For Questions, Please Contact: Lab Manager, Fernley
Ryan Steele
775-835-8282



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APPROVED
REVISE AND RESUBMIT



APPROVED WITH CHANGES NOTED
REJECTED



APPENDIX H.7 – 80-MIL LLDPE GEOMEMBRANE RESIN QC CERTIFICATES



Certificate of Analysis

Shipped To: AGRU AMERICA INC:FERNLEY
2000 EAST NEWLANDS
FERNLEY NV 89408
USA

Recipient: PALMER
Fax:

Delivery #: 80540994
PO #: 18729
Weight: 179600.000 LB
Ship Date: 10/25/2021
Package: BULK
Mode: Hopper Car
Car #: CPCX816394
Seal No: 263746

Product:
MARLEX 7104 POLYETHYLENE in Bulk

Lot Number: DNK810410

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.34	g/10min
HLMI	ASTM D1238	14.20	g/10min
Pellet Count	ST-905	32	pelet/gram
Production date		20211014	
Density	D1505	0.919	g/cm3

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP (CPChem).
However, there is no warranty of any kind, either expressed or implied, applicable to its use, and the user assumes all risk and liability in connection therewith.

AMANDA ROBY
QUALITY ASSURANCE SUPERINTENDENT

For CoA questions contact Leslie Dziamara at +1-832-813-4806



Formosa Plastics

FORMOSA PLASTICS CORPORATION, TEXAS

201 FORMOSA DRIVE
PO BOX 700
POINT COMFORT

TX 77978

PHONE: (888) FPCUSA3

Certificate of Analysis (CONFIDENTIAL)

CUSTOMER: AGRU/AMERICA, INC.
2000 E NEWLAND DRIVE

FERNLEY

NV 89408

PRODUCT : L91904B

RAILCAR ACFX041846

CLEANING/INSPECTION NO: 041846111121

S/O NO : JWCA232

CUSTOMER PO : PO 18939

DATE SHIPPED: 12/29/21

LOT NO : 21KB544

WEIGHT (LB) : 180,000.00

CUSTID: FT03888 SPIDM1

TEST ITEM

REFERENCE METHOD

TEST VALUE

Melt Index, g/10min

ASTM D1238

.44

Density, g/cm3

ASTM D1505

.9201

Linda Kao

QC SUPERVISOR: LINDA KAO



January 29, 2014

Mail To:

Grant Palmer
Agru America
500 Garrison Road
Georgetown, SC 29440

email: gp@AgruAmerica.com

Bill To:

<= Same

Dear Mr. Palmer:

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

TRI Job Reference Number: E2386-59-09

Material(s) Tested: One Agru 80 mil Microspike LLDPE Geomembrane(s)

Test(s) Requested: 2% Secant (ASTM D5323 via ASTM D638, GM17)
Multi-axial Tensile (ASTM D 5617)

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

Sincerely,

Mansukh Patel
Laboratory Manager
Geosynthetic Services Division
www.GeosyntheticTesting.com



September 29, 2016

January 11, 2017 Updated UV Resistance (D 7238) & Oven Aging (D 5721)

Mail To:

Nathan Ivy
Agru America
500 Garrison Rd
Georgetown, SC 29440

email: nivy@agruamerica.com

Bill To:

<= Same

Dear Mr. Ivy:

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

Project: **Trial 16-006**

TRI Job Reference Number: 24280

Material(s) Tested: One, Agru 40 mil Smooth LLDPE Geomembrane

Test(s) Requested: 2% Secant Modulus (ASTM D 5323)
Multi-axial Tensile (ASTM D 5617)
Data Updated==> UV Resistance (ASTM D 7238)
Data Updated==> Oven Aging (ASTM D5721)

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

Sincerely,

Mansukh Patel
Laboratory Manager
Geosynthetic Services Division
www.GeosyntheticTesting.com

*Signature is on file



GEOMEMBRANE TEST RESULTS

TRI Client: Agru America

Project: Trial 16-006

Material: Agru 40 mil Smooth LLDPE Geomembrane

Sample Identification: G16D002549 , , Formasa L91507H

TRI Log #: 24280

PARAMETER	TEST REPLICATE NUMBER										STD.	
	1	2	3	4	5	6	7	8	9	10	MEAN	DEV.
2% Secant Modulus (ASTM D 5323, 2 ipm strain rate, modulus at 2% strain)												
MD 2% Secant Modulus (psi)	30710	32447	32924	31549	30236						31573	1132
MD 2% Secant Modulus (ppi)	1367	1430.9	1481.6	1303	1285						1373	83
TD 2% Secant Modulus (psi)	33432	30097	32079	34335	32442						32477	1596
TD 2% Secant Modulus (ppi)	1381	1258.1	1340.9	1407.7	1326.9						1343	57
Multi-axial Tensile (ASTM D 5617)												
Thickness (mils)	40	38	40								40	1
Maximum Stress (psi)	1540	1612	1590								1581	37
% Elongation @ Rupture (%)	90.6	107.6	86.3								94.8	11.3
Failure Description	H-CAT N-EF	TDT N-EF	MDT N-EF									
MDT	A tear in the machine direction.											
H	Circular or elliptical hole in the specimen.											
H-CAT	Circular or elliptical hole in an area where the material has significantly necked down or thinned. The large thinned area resembles a pupil of a cat eye.											
N-EF	No edge failure											



GEOMEMBRANE TEST RESULTS

TRI Client: Agru America

Project: Trial 16-006

Material: Agru 40 mil Smooth LLDPE Geomembrane

Sample Identification: G16D002549 , , Formasa L91507H

TRI Log #: 24280

PARAMETER	TEST REPLICATE NUMBER										STD.	
	1	2	3	4	5	6	7	8	9	10	MEAN	DEV.
UV Resistance (ASTM D 7238)												
The resistance to degradation due to exposure to ultraviolet light and moisture was determined in accordance with GRI-GM11, Accelerated Weathering of Geomembranes Using a Fluorescent UVA Device. This standard covers the basic principles for using the QUV apparatus to accelerate the weathering of geomembranes using UVA bulbs and condensation. To comply with Specification GRI GM13, the sample was exposed to 1600 hours of UV exposure composed of 80 cycles of UA at 75 C for 20 hours followed by condensation at 60 C for 4 hours. The High Pressure Oxidative Induction Time (HPOIT) was evaluated before and after the exposure and results were as follows.												
HPOIT (minutes) - Baseline											574	PERCENT RETAINED
HPOIT (minutes) - After QUV Aging											418	
Note: No surface cracking was observed.												73
Oven Aging (ASTM D 5721)												
The geomembrane was exposed to 90 days of elevated temperature exposure in an air oven maintained at 85°C ± 0.5°C in accordance with ASTM D 5721-95, Standard Practice for Air-Oven Aging of Polyolefin Geomembranes. High Pressure Oxidative Induction Time (HPOIT) was tested after exposure and compared to values generated for unexposed material. The results are provided below.												
HPOIT (minutes) - Baseline											574	PERCENT RETAINED
HPOIT (minutes) - After Oven Aging											561	
Note: No surface cracking was observed.												98



GEOMEMBRANE TEST RESULTS

TRI Client: Agru America

Material: Agru 80 mil Microspike LLDPE Geomembrane

Sample Identification: G14D031009 , Chevron 7104 LLDPE Resin, Resin Lot # CDG810350

TRI Log #: E2386-59-09

PARAMETER											TEST REPLICATE NUMBER											MEAN	STD. DEV.	
											1	2	3	4	5	6	7	8	9	10				
2% Secant Modulus (ASTM D5323 via ASTM D638, GM17)																								
MD 2% Secant Modulus (psi)		30887	30305	30617	32594	31327																	31146	892
MD 2% Secant Modulus (ppi)		2662	2530	2596	2533	2444																	2553	82
TD 2% Secant Modulus (psi)		35037	35745	35187	37057	34833																	35572	897
TD 2% Secant Modulus (ppi)		2950	2760	3065	2827	2675																	2855	154
Multi-axial Tensile (ASTM D 5617)																								
Test Method A: Centerpoint Deflection Versus Pressure																								
Thickness (mils)		81.0	78.0	79.0																	79.3	1.5		
Maximum Stress (psi)		1873	1781	1899																	1851	62		
% Elongation @ Rupture (%)		77.6	77.0	85.0																	79.9	4.5		
Failure Description		MDT N-EF	MDT N-EF	MDT N-EF																				
MDT	A tear in the machine direction.																							
H	Circular or elliptical hole in the specimen.																							
H-CAT	Circular or elliptical hole in an area where the material has significantly necked down or thinned. The large thinned area resembles a pupil of a cat eye.																							
N-EF	No edge failure																							
MD Machine Direction		TD Transverse Direction																						



Certificate of Analysis

Shipped To: AGRU AMERICA INC:FERNLEY
2000 Newlands Dr E
FERNLEY NV 89408-8944
USA

Recipient: PALMER
Fax:

Delivery #: 80715572
PO #: 19485
Weight: 185350.000 LB
Ship Date: 07/15/2022
Package: BULK
Mode: Hopper Car
Car #: CPCX805072
Seal No: 302679

Product:
MARLEX 7104 POLYETHYLENE in Bulk

Lot Number: DPF811480

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.34	g/10min
HLMI	ASTM D1238	13.20	g/10min
Pellet Count	ST-905	33	pelet/gram
Production date		20220621	
Density	D1505	0.919	g/cm3

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP (CPChem).
However, there is no warranty of any kind, either expressed or implied, applicable to its use, and the user assumes all risk and liability in connection therewith.

AMANDA ROBY
QUALITY ASSURANCE SUPERINTENDENT

For CoA questions contact Leslie Dziamara at +1-832-813-4806



Vergil H. Rhodes, PE, CPlasT - Tech Svc & App Dev Engineer, Geomembranes
Highways 60 & 123, Bartlesville Research and Technology Center, Room 103 PTC
Bartlesville, OK 74003
■ 539-529-4279 ■ rhodevh@cpchem.com ■ Fax: 918-977-7599 ■ www.cpchem.com

November 12, 2021

Filename: Agru Oven and QUV Exposure for HP-OIT Testing_2021_111221.pdf

Nathan Ivy - Corporate Quality Control/Technical Manager
Agru America, Inc.
800 Rockmead #122
Kingwood, TX 77339
281-358-4741

Dear Mr. Ivy:

Please recall your request for testing of oven-exposed and UV-exposed geomembrane samples produced primarily from Marlex® 7104 LLDPE and Marlex® K307 MDPE. Agru blended other components with each of these polyethylenes to produce the geomembrane samples for testing. Geomembrane samples have been received from Agru, and test specimens were taken from the smooth areas of the samples. Test results are reported on the following two pages. The samples were tested for HP-OIT in their as-received condition and were also tested after oven and UV exposures of 90 days and 1600 hours of irradiance, respectively, in accordance with GRI-GM13 and GRI-GM17 requirements.

The following geomembrane sheet samples were received from Agru in July 2021 and were reported to be primarily composed of each of the Chevron Phillips Chemical Company grades in the description below:

- Marlex® K307 Lot # PND821550, Agru Roll # GTC0078250016, black sheet, smooth, nominal 0.057" thick.
- Marlex® 7104 Lot # DNE810980, Agru Roll # GTA0077190117, black sheet, textured, nominal 0.055" thick.

The exposure and testing conditions along with the corresponding test results are tabulated on the next two pages. GM-13 and GM-17 require a minimum % HP-OIT retention after a 90-day oven exposure and after a 1600-hour UV irradiance exposure. These test results indicate the GM-13 and GM-17 minimum % HP-OIT retentions were exceeded by the Agru-supplied K307 and 7104 sheet samples, respectively.

If you have any questions, please feel free to contact me (contact information given above).

Sincerely,

Vergil Rhodes
Polyethylene Technical Service and Applications Development, Geomembrane

NOTICES

Technical Information - By using any Technical Information contained herein, Recipient agrees that said Technical Information is given by CPChem for convenience only, without any warranty or guarantee of any kind, and is accepted and used at your sole risk. Recipients are encouraged to verify independently any such information to their reasonable satisfaction. As used in this paragraph, "Technical Information" includes any technical advice, recommendations, testing, or analysis, including, without limitation, information as it may relate to the selection of a product for a specific use and application.

The following oven aging and UV exposure test methods were conducted in accordance with the GRI-GM13 (HDPE) and GRI-GM17 (LLDPE) requirements:

Test Name	Exposure Conditions	Test Method
Oven Aging	90 days in an oven at 85 °C	ASTM D5721
UV Exposure	1600 UV irradiance hours. Cycle: 20 hours UVA-340 at 75 °C followed by 4 hours dark with condensation at 60 °C. Irradiance was 0.78 W/m ² at wavelength 340 nm. Note: This implies a total UV chamber residence time of 1920 hours, e.g., 1600 hours of irradiance and 320 hours of dark/condensation.	ASTM D7238
HP-OIT	150 °C in an oxygen atmosphere at 500 psi	ASTM D5885

Oven Aging Results:

Sample	Initial HP-OIT (min)	HP-OIT after 90 days of oven aging. (min)	% HP-OIT Retained after 90 days of oven aging.	GRI-GM13 and GRI-GM17 minimum % HP-OIT requirements after 90 days of oven aging.
K307 Lot # PND821550, Agru Roll # GTC0078250016, black sheet, smooth, nominal 0.057" thick	1313	1174	89.4%	GRI-GM13: % HP-OIT: 80% minimum
7104 Lot # DNE810980, Agru Roll # GTA0077190117, black sheet, textured, nominal 0.055" thick	973	802	82.4%	GRI-GM17: % HP-OIT: 60% minimum

Continued on Page 3 - - -

NOTICES

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UV Aging Results:

Sample	Initial HP-OIT (min)	HP-OIT after 1600 hrs of UV exposure. (min)	% HP-OIT Retained after 1600 hrs of UV exposure.	GRI-GM13 and GRI-GM17 minimum % HP-OIT requirements after 1600 hours of UV exposure.
K307 Lot # PND821550, Agru Roll # GTC0078250016, black sheet, smooth, nominal 0.057" thick	1313	1053	80.2%	GRI-GM13: % HP-OIT: 50% minimum
7104 Lot # DNE810980, Agru Roll # GTA0077190117, black sheet, textured, nominal 0.055" thick	973	768	78.9%	GRI-GM17: % HP-OIT: 35% minimum

Notes:

- 1600 hours of UV exposure in accordance with ASTM D7238 implies a total UV chamber residence time of 1920 hours, e.g., 1600 hours of irradiance and 320 hours of darkness with condensation.
- Sheet samples were aged with the shiny side of the sheet facing the UV bulbs.

NOTICES

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January 29, 2014

Mail To:

Grant Palmer
Agru America
500 Garrison Road
Georgetown, SC 29440

email: gp@AgruAmerica.com

Bill To:

<= Same

Dear Mr. Palmer:

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

TRI Job Reference Number: E2386-59-09

Material(s) Tested: One Agru 80 mil Microspike LLDPE Geomembrane(s)

Test(s) Requested: 2% Secant (ASTM D5323 via ASTM D638, GM17)
Multi-axial Tensile (ASTM D 5617)

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

Sincerely,

Mansukh Patel
Laboratory Manager
Geosynthetic Services Division
www.GeosyntheticTesting.com



GEOMEMBRANE TEST RESULTS

TRI Client: Agru America

Material: Agru 80 mil Microspike LLDPE Geomembrane

Sample Identification: G14D031009 , Chevron 7104 LLDPE Resin, Resin Lot # CDG810350

TRI Log #: E2386-59-09

PARAMETER											TEST REPLICATE NUMBER											MEAN	STD. DEV.
											1	2	3	4	5	6	7	8	9	10			
2% Secant Modulus (ASTM D5323 via ASTM D638, GM17)																							
MD 2% Secant Modulus (psi)		30887	30305	30617	32594	31327								31146	892								
MD 2% Secant Modulus (ppi)		2662	2530	2596	2533	2444								2553	82								
TD 2% Secant Modulus (psi)		35037	35745	35187	37057	34833								35572	897								
TD 2% Secant Modulus (ppi)		2950	2760	3065	2827	2675								2855	154								
Multi-axial Tensile (ASTM D 5617)																							
Test Method A: Centerpoint Deflection Versus Pressure																							
Thickness (mils)		81.0	78.0	79.0								79.3	1.5										
Maximum Stress (psi)		1873	1781	1899								1851	62										
% Elongation @ Rupture (%)		77.6	77.0	85.0								79.9	4.5										
Failure Description		MDT N-EF	MDT N-EF	MDT N-EF																			
MDT	A tear in the machine direction.																						
H	Circular or elliptical hole in the specimen.																						
H-CAT	Circular or elliptical hole in an area where the material has significantly necked down or thinned. The large thinned area resembles a pupil of a cat eye.																						
N-EF	No edge failure																						
MD Machine Direction		TD Transverse Direction																					



Certificate of Analysis

Shipped To: AGRU AMERICA INC:FERNLEY
2000 Newlands Dr E
FERNLEY NV 89408-8944
USA

Recipient: PALMER
Fax:

Delivery #: 80715572
PO #: 19485
Weight: 185350.000 LB
Ship Date: 07/15/2022
Package: BULK
Mode: Hopper Car
Car #: CPCX805072
Seal No: 302679

Product:
MARLEX 7104 POLYETHYLENE in Bulk

Lot Number: DPF811480

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.34	g/10min
HLMI	ASTM D1238	13.20	g/10min
Pellet Count	ST-905	33	pelet/gram
Production date		20220621	
Density	D1505	0.919	g/cm3

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP (CPChem).
However, there is no warranty of any kind, either expressed or implied, applicable to its use, and the user assumes all risk and liability in connection therewith.

AMANDA ROBY
QUALITY ASSURANCE SUPERINTENDENT

For CoA questions contact Leslie Dziamara at +1-832-813-4806



Certificate of Analysis

Shipped To: AGRU AMERICA INC:FERNLEY
2000 Newlands Dr E
FERNLEY NV 89408-8944
USA

Recipient: PALMER
Fax:

Delivery #: 80745750
PO #: 19616
Weight: 188450.000 LB
Ship Date: 08/31/2022
Package: BULK
Mode: Hopper Car
Car #: TILX624120
Seal No: 303241

Product:
MARLEX 7104 POLYETHYLENE in Bulk

Lot Number: DPH810510

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.34	g/10min
HLMI	ASTM D1238	15.10	g/10min
Pellet Count	ST-905	34	pelet/gram
Production date		20220818	
Density	D1505	0.919	g/cm3

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AMANDA ROBY
QUALITY ASSURANCE SUPERINTENDENT

For CoA questions contact Leslie Dziamara at +1-832-813-4806



Certificate of Analysis

Shipped To: AGRU AMERICA INC:FERNLEY
2000 Newlands Dr E
FERNLEY NV 89408-8944
USA

Recipient: PALMER
Fax:

Delivery #: 80699959
PO #: 19423
Weight: 188350.000 LB
Ship Date: 06/22/2022
Package: BULK
Mode: Hopper Car
Car #: CHVX889338
Seal No: 298633

Product:
MARLEX 7104 POLYETHYLENE in Bulk

Lot Number: DPF811350

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.35	g/10min
HLMI	ASTM D1238	14.70	g/10min
Pellet Count	ST-905	35	pelet/gram
Production date		20220620	
Density	D1505	0.919	g/cm3

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP (CPChem).
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AMANDA ROBY
QUALITY ASSURANCE SUPERINTENDENT

For CoA questions contact Leslie Dziamara at +1-832-813-4806



Vergil H. Rhodes, PE, CPlasT - Tech Svc & App Dev Engineer, Geomembranes
Highways 60 & 123, Bartlesville Research and Technology Center, Room 103 PTC
Bartlesville, OK 74003
■ 539-529-4279 ■ rhodevh@cpchem.com ■ Fax: 918-977-7599 ■ www.cpchem.com

November 12, 2021

Filename: Agru Oven and QUV Exposure for HP-OIT Testing_2021_111221.pdf

Nathan Ivy - Corporate Quality Control/Technical Manager
Agru America, Inc.
800 Rockmead #122
Kingwood, TX 77339
281-358-4741

Dear Mr. Ivy:

Please recall your request for testing of oven-exposed and UV-exposed geomembrane samples produced primarily from Marlex® 7104 LLDPE and Marlex® K307 MDPE. Agru blended other components with each of these polyethylenes to produce the geomembrane samples for testing. Geomembrane samples have been received from Agru, and test specimens were taken from the smooth areas of the samples. Test results are reported on the following two pages. The samples were tested for HP-OIT in their as-received condition and were also tested after oven and UV exposures of 90 days and 1600 hours of irradiance, respectively, in accordance with GRI-GM13 and GRI-GM17 requirements.

The following geomembrane sheet samples were received from Agru in July 2021 and were reported to be primarily composed of each of the Chevron Phillips Chemical Company grades in the description below:

- Marlex® K307 Lot # PND821550, Agru Roll # GTC0078250016, black sheet, smooth, nominal 0.057" thick.
- Marlex® 7104 Lot # DNE810980, Agru Roll # GTA0077190117, black sheet, textured, nominal 0.055" thick.

The exposure and testing conditions along with the corresponding test results are tabulated on the next two pages. GM-13 and GM-17 require a minimum % HP-OIT retention after a 90-day oven exposure and after a 1600-hour UV irradiance exposure. These test results indicate the GM-13 and GM-17 minimum % HP-OIT retentions were exceeded by the Agru-supplied K307 and 7104 sheet samples, respectively.

If you have any questions, please feel free to contact me (contact information given above).

Sincerely,

Vergil Rhodes
Polyethylene Technical Service and Applications Development, Geomembrane

NOTICES

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The following oven aging and UV exposure test methods were conducted in accordance with the GRI-GM13 (HDPE) and GRI-GM17 (LLDPE) requirements:

Test Name	Exposure Conditions	Test Method
Oven Aging	90 days in an oven at 85 °C	ASTM D5721
UV Exposure	1600 UV irradiance hours. Cycle: 20 hours UVA-340 at 75 °C followed by 4 hours dark with condensation at 60 °C. Irradiance was 0.78 W/m ² at wavelength 340 nm. Note: This implies a total UV chamber residence time of 1920 hours, e.g., 1600 hours of irradiance and 320 hours of dark/condensation.	ASTM D7238
HP-OIT	150 °C in an oxygen atmosphere at 500 psi	ASTM D5885

Oven Aging Results:

Sample	Initial HP-OIT (min)	HP-OIT after 90 days of oven aging. (min)	% HP-OIT Retained after 90 days of oven aging.	GRI-GM13 and GRI-GM17 minimum % HP-OIT requirements after 90 days of oven aging.
K307 Lot # PND821550, Agru Roll # GTC0078250016, black sheet, smooth, nominal 0.057" thick	1313	1174	89.4%	GRI-GM13: % HP-OIT: 80% minimum
7104 Lot # DNE810980, Agru Roll # GTA0077190117, black sheet, textured, nominal 0.055" thick	973	802	82.4%	GRI-GM17: % HP-OIT: 60% minimum

Continued on Page 3 - - -

NOTICES

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UV Aging Results:

Sample	Initial HP-OIT (min)	HP-OIT after 1600 hrs of UV exposure. (min)	% HP-OIT Retained after 1600 hrs of UV exposure.	GRI-GM13 and GRI-GM17 minimum % HP-OIT requirements after 1600 hours of UV exposure.
K307 Lot # PND821550, Agru Roll # GTC0078250016, black sheet, smooth, nominal 0.057" thick	1313	1053	80.2%	GRI-GM13: % HP-OIT: 50% minimum
7104 Lot # DNE810980, Agru Roll # GTA0077190117, black sheet, textured, nominal 0.055" thick	973	768	78.9%	GRI-GM17: % HP-OIT: 35% minimum

Notes:

- 1600 hours of UV exposure in accordance with ASTM D7238 implies a total UV chamber residence time of 1920 hours, e.g., 1600 hours of irradiance and 320 hours of darkness with condensation.
- Sheet samples were aged with the shiny side of the sheet facing the UV bulbs.

NOTICES

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January 29, 2014

Mail To:

Grant Palmer
Agru America
500 Garrison Road
Georgetown, SC 29440

email: gp@AgruAmerica.com

Bill To:

<= Same

Dear Mr. Palmer:

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

TRI Job Reference Number: E2386-59-09

Material(s) Tested: One Agru 80 mil Microspike LLDPE Geomembrane(s)

Test(s) Requested: 2% Secant (ASTM D5323 via ASTM D638, GM17)
Multi-axial Tensile (ASTM D 5617)

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

Sincerely,

Mansukh Patel
Laboratory Manager
Geosynthetic Services Division
www.GeosyntheticTesting.com



GEOMEMBRANE TEST RESULTS

TRI Client: Agru America

Material: Agru 80 mil Microspike LLDPE Geomembrane

Sample Identification: G14D031009 , Chevron 7104 LLDPE Resin, Resin Lot # CDG810350

TRI Log #: E2386-59-09

PARAMETER											TEST REPLICATE NUMBER											MEAN	STD. DEV.	
											1	2	3	4	5	6	7	8	9	10				
2% Secant Modulus (ASTM D5323 via ASTM D638, GM17)																								
MD 2% Secant Modulus (psi)		30887	30305	30617	32594	31327																	31146	892
MD 2% Secant Modulus (ppi)		2662	2530	2596	2533	2444																	2553	82
TD 2% Secant Modulus (psi)		35037	35745	35187	37057	34833																	35572	897
TD 2% Secant Modulus (ppi)		2950	2760	3065	2827	2675																	2855	154
Multi-axial Tensile (ASTM D 5617)																								
Test Method A: Centerpoint Deflection Versus Pressure																								
Thickness (mils)		81.0	78.0	79.0																	79.3	1.5		
Maximum Stress (psi)		1873	1781	1899																	1851	62		
% Elongation @ Rupture (%)		77.6	77.0	85.0																	79.9	4.5		
Failure Description		MDT N-EF	MDT N-EF	MDT N-EF																				
MDT	A tear in the machine direction.																							
H	Circular or elliptical hole in the specimen.																							
H-CAT	Circular or elliptical hole in an area where the material has significantly necked down or thinned. The large thinned area resembles a pupil of a cat eye.																							
N-EF	No edge failure																							
MD Machine Direction		TD Transverse Direction																						

Certificate of Analysis

Shipped To: AGRU AMERICA INC:FERNLEY
2000 Newlands Dr E
FERNLEY NV 89408-8944
USA

Recipient: PALMER
Fax:

Delivery #: 80699959
PO #: 19423
Weight: 188350.000 LB
Ship Date: 06/22/2022
Package: BULK
Mode: Hopper Car
Car #: CHVX889338
Seal No: 298633

Product:
MARLEX 7104 POLYETHYLENE in Bulk

Lot Number: DPF811350

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.35	g/10min
HLMI	ASTM D1238	14.70	g/10min
Pellet Count	ST-905	35	pelet/gram
Production date		20220620	
Density	D1505	0.919	g/cm3

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP (CPChem).
However, there is no warranty of any kind, either expressed or implied, applicable to its use, and the user assumes all risk and liability in connection therewith.



AMANDA ROBY
QUALITY ASSURANCE SUPERINTENDENT


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☒ APPROVED
☐ REVISE AND RESUBMIT

☐ APPROVED WITH CHANGES NOTED
☐ REJECTED

DATE: Sep 23, 2022 BY: Nikoliya L. Boyanich

For CoA questions contact Leslie Dziamara at +1-832-813-4806

Certificate of Analysis

Shipped To: AGRU AMERICA INC:FERNLEY
2000 Newlands Dr E
FERNLEY NV 89408-8944
USA

Recipient: PALMER
Fax:

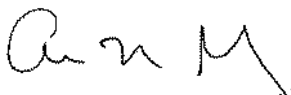
Delivery #: 80745750
PO #: 19616
Weight: 188450.000 LB
Ship Date: 08/31/2022
Package: BULK
Mode: Hopper Car
Car #: TILX624120
Seal No: 303241

Product:
MARLEX 7104 POLYETHYLENE in Bulk

Lot Number: DPH810510

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.34	g/10min
HLMI	ASTM D1238	15.10	g/10min
Pellet Count	ST-905	34	pelet/gram
Production date		20220818	
Density	D1505	0.919	g/cm3

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP (CPChem).
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☒ APPROVED
☐ REVISE AND RESUBMIT

☐ APPROVED WITH CHANGES NOTED
☐ REJECTED

DATE: Sep 23, 2022 BY: Nikoliya L. Boyanich

For CoA questions contact Leslie Dziamara at +1-832-813-4806



Vergil H. Rhodes, PE, CPlasT - Tech Svc & App Dev Engineer, Geomembranes
Highways 60 & 123, Bartlesville Research and Technology Center, Room 103 PTC
Bartlesville, OK 74003
■ 539-529-4279 ■ rhodevh@cpchem.com ■ Fax: 918-977-7599 ■ www.cpchem.com

November 12, 2021

Filename: Agru Oven and QUV Exposure for HP-OIT Testing_2021_111221.pdf

Nathan Ivy - Corporate Quality Control/Technical Manager
Agru America, Inc.
800 Rockmead #122
Kingwood, TX 77339
281-358-4741

Dear Mr. Ivy:

Please recall your request for testing of oven-exposed and UV-exposed geomembrane samples produced primarily from Marlex® 7104 LLDPE and Marlex® K307 MDPE. Agru blended other components with each of these polyethylenes to produce the geomembrane samples for testing. Geomembrane samples have been received from Agru, and test specimens were taken from the smooth areas of the samples. Test results are reported on the following two pages. The samples were tested for HP-OIT in their as-received condition and were also tested after oven and UV exposures of 90 days and 1600 hours of irradiance, respectively, in accordance with GRI-GM13 and GRI-GM17 requirements.

The following geomembrane sheet samples were received from Agru in July 2021 and were reported to be primarily composed of each of the Chevron Phillips Chemical Company grades in the description below:

- Marlex® K307 Lot # PND821550, Agru Roll # GTC0078250016, black sheet, smooth, nominal 0.057" thick.
- Marlex® 7104 Lot # DNE810980, Agru Roll # GTA0077190117, black sheet, textured, nominal 0.055" thick.

The exposure and testing conditions along with the corresponding test results are tabulated on the next two pages. GM-13 and GM-17 require a minimum % HP-OIT retention after a 90-day oven exposure and after a 1600-hour UV irradiance exposure. These test results indicate the GM-13 and GM-17 minimum % HP-OIT retentions were exceeded by the Agru-supplied K307 and 7104 sheet samples, respectively.

If you have any questions, please feel free to contact me (contact information given above).

Sincerely,

Vergil Rhodes
Polyethylene Technical Service and Applications Development, Geomembrane

NOTICES

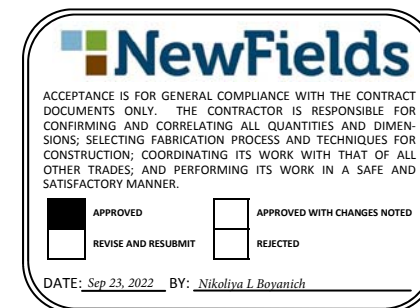
Technical Information - By using any Technical Information contained herein, Recipient agrees that said Technical Information is given by CPChem for convenience only, without any warranty or guarantee of any kind, and is accepted and used at your sole risk. Recipients are encouraged to verify independently any such information to their reasonable satisfaction. As used in this paragraph, "Technical Information" includes any technical advice, recommendations, testing, or analysis, including, without limitation, information as it may relate to the selection of a product for a specific use and application.

The following oven aging and UV exposure test methods were conducted in accordance with the GRI-GM13 (HDPE) and GRI-GM17 (LLDPE) requirements:

Test Name	Exposure Conditions	Test Method
Oven Aging	90 days in an oven at 85 °C	ASTM D5721
UV Exposure	1600 UV irradiance hours. Cycle: 20 hours UVA-340 at 75 °C followed by 4 hours dark with condensation at 60 °C. Irradiance was 0.78 W/m ² at wavelength 340 nm. Note: This implies a total UV chamber residence time of 1920 hours, e.g., 1600 hours of irradiance and 320 hours of dark/condensation.	ASTM D7238
HP-OIT	150 °C in an oxygen atmosphere at 500 psi	ASTM D5885

Oven Aging Results:

Sample	Initial HP-OIT (min)	HP-OIT after 90 days of oven aging. (min)	% HP-OIT Retained after 90 days of oven aging.	GRI-GM13 and GRI-GM17 minimum % HP-OIT requirements after 90 days of oven aging.
K307 Lot # PND821550, Agru Roll # GTC0078250016, black sheet, smooth, nominal 0.057" thick	1313	1174	89.4%	GRI-GM13: % HP-OIT: 80% minimum
7104 Lot # DNE810980, Agru Roll # GTA0077190117, black sheet, textured, nominal 0.055" thick	973	802	82.4%	GRI-GM17: % HP-OIT: 60% minimum



Continued on Page 3 - - -

NOTICES

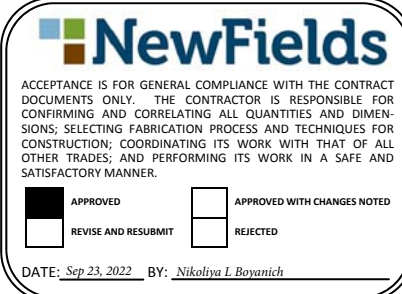
Technical Information - By using any Technical Information contained herein, Recipient agrees that said Technical Information is given by CPChem for convenience only, without any warranty or guarantee of any kind, and is accepted and used at your sole risk. Recipients are encouraged to verify independently any such information to their reasonable satisfaction. As used in this paragraph, "Technical Information" includes any technical advice, recommendations, testing, or analysis, including, without limitation, information as it may relate to the selection of a product for a specific use and application.

UV Aging Results:

Sample	Initial HP-OIT (min)	HP-OIT after 1600 hrs of UV exposure. (min)	% HP-OIT Retained after 1600 hrs of UV exposure.	GRI-GM13 and GRI-GM17 minimum % HP-OIT requirements after 1600 hours of UV exposure.
K307 Lot # PND821550, Agru Roll # GTC0078250016, black sheet, smooth, nominal 0.057" thick	1313	1053	80.2%	GRI-GM13: % HP-OIT: 50% minimum
7104 Lot # DNE810980, Agru Roll # GTA0077190117, black sheet, textured, nominal 0.055" thick	973	768	78.9%	GRI-GM17: % HP-OIT: 35% minimum

Notes:

- 1600 hours of UV exposure in accordance with ASTM D7238 implies a total UV chamber residence time of 1920 hours, e.g., 1600 hours of irradiance and 320 hours of darkness with condensation.
- Sheet samples were aged with the shiny side of the sheet facing the UV bulbs.



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☒ APPROVED
☐ REVISE AND RESUBMIT
 ☐ APPROVED WITH CHANGES NOTED
☐ REJECTED

DATE: Sep 23, 2022 BY: Nikaliya L. Boyanich

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January 29, 2014

Mail To:

Grant Palmer
Agru America
500 Garrison Road
Georgetown, SC 29440

email: gp@AgruAmerica.com

Bill To:

<= Same

Dear Mr. Palmer:

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

TRI Job Reference Number: E2386-59-09

Material(s) Tested: One Agru 80 mil Microspike LLDPE Geomembrane(s)

Test(s) Requested: 2% Secant (ASTM D5323 via ASTM D638, GM17)
Multi-axial Tensile (ASTM D 5617)

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

Sincerely,

Mansukh Patel
Laboratory Manager
Geosynthetic Services Division
www.GeosyntheticTesting.com



GEOMEMBRANE TEST RESULTS

TRI Client: Agru America

Material: Agru 80 mil Microspike LLDPE Geomembrane

Sample Identification: G14D031009 , Chevron 7104 LLDPE Resin, Resin Lot # CDG810350

TRI Log #: E2386-59-09

PARAMETER											TEST REPLICATE NUMBER											MEAN	STD. DEV.	
											1	2	3	4	5	6	7	8	9	10				
2% Secant Modulus (ASTM D5323 via ASTM D638, GM17)																								
MD 2% Secant Modulus (psi)		30887	30305	30617	32594	31327																	31146	892
MD 2% Secant Modulus (ppi)		2662	2530	2596	2533	2444																	2553	82
TD 2% Secant Modulus (psi)		35037	35745	35187	37057	34833																	35572	897
TD 2% Secant Modulus (ppi)		2950	2760	3065	2827	2675																	2855	154
Multi-axial Tensile (ASTM D 5617)																								
Test Method A: Centerpoint Deflection Versus Pressure																								
Thickness (mils)		81.0	78.0	79.0																	79.3	1.5		
Maximum Stress (psi)		1873	1781	1899																	1851	62		
% Elongation @ Rupture (%)		77.6	77.0	85.0																	79.9	4.5		
Failure Description		MDT N-EF	MDT N-EF	MDT N-EF																				
MDT	A tear in the machine direction.																							
H	Circular or elliptical hole in the specimen.																							
H-CAT	Circular or elliptical hole in an area where the material has significantly necked down or thinned. The large thinned area resembles a pupil of a cat eye.																							
N-EF	No edge failure																							
MD Machine Direction		TD Transverse Direction																						

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☒ APPROVED	☐ APPROVED WITH CHANGES NOTED
☐ REVISE AND RESUBMIT	☐ REJECTED
DATE: Sep 23, 2022 BY: Nikoliya L. Boyanich	

Certificate of Analysis

Shipped To: AGRU AMERICA INC:FERNLEY
2000 Newlands Dr E
FERNLEY NV 89408-8944
USA

Recipient: PALMER
Fax:

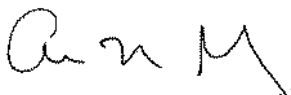
Delivery #: 80745750
PO #: 19616
Weight: 188450.000 LB
Ship Date: 08/31/2022
Package: BULK
Mode: Hopper Car
Car #: TILX624120
Seal No: 303241

Product:
MARLEX 7104 POLYETHYLENE in Bulk

Lot Number: DPH810510

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.34	g/10min
HLMI	ASTM D1238	15.10	g/10min
Pellet Count	ST-905	34	pelet/gram
Production date		20220818	
Density	D1505	0.919	g/cm3

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP (CPChem).
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AMANDA ROBY
QUALITY ASSURANCE SUPERINTENDENT



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☒ APPROVED
☐ REVISE AND RESUBMIT

☐ APPROVED WITH CHANGES NOTED
☐ REJECTED

DATE: Sep 23, 2022 BY: Nikoliya L. Boyanich

For CoA questions contact Leslie Dziamara at +1-832-813-4806



Vergil H. Rhodes, PE, CPlasT - Tech Svc & App Dev Engineer, Geomembranes
Highways 60 & 123, Bartlesville Research and Technology Center, Room 103 PTC
Bartlesville, OK 74003
■ 539-529-4279 ■ rhodevh@cpchem.com ■ Fax: 918-977-7599 ■ www.cpchem.com

November 12, 2021

Filename: Agru Oven and QUV Exposure for HP-OIT Testing_2021_111221.pdf

Nathan Ivy - Corporate Quality Control/Technical Manager
Agru America, Inc.
800 Rockmead #122
Kingwood, TX 77339
281-358-4741

Dear Mr. Ivy:

Please recall your request for testing of oven-exposed and UV-exposed geomembrane samples produced primarily from Marlex® 7104 LLDPE and Marlex® K307 MDPE. Agru blended other components with each of these polyethylenes to produce the geomembrane samples for testing. Geomembrane samples have been received from Agru, and test specimens were taken from the smooth areas of the samples. Test results are reported on the following two pages. The samples were tested for HP-OIT in their as-received condition and were also tested after oven and UV exposures of 90 days and 1600 hours of irradiance, respectively, in accordance with GRI-GM13 and GRI-GM17 requirements.

The following geomembrane sheet samples were received from Agru in July 2021 and were reported to be primarily composed of each of the Chevron Phillips Chemical Company grades in the description below:

- Marlex® K307 Lot # PND821550, Agru Roll # GTC0078250016, black sheet, smooth, nominal 0.057" thick.
- Marlex® 7104 Lot # DNE810980, Agru Roll # GTA0077190117, black sheet, textured, nominal 0.055" thick.

The exposure and testing conditions along with the corresponding test results are tabulated on the next two pages. GM-13 and GM-17 require a minimum % HP-OIT retention after a 90-day oven exposure and after a 1600-hour UV irradiance exposure. These test results indicate the GM-13 and GM-17 minimum % HP-OIT retentions were exceeded by the Agru-supplied K307 and 7104 sheet samples, respectively.

If you have any questions, please feel free to contact me (contact information given above).

Sincerely,

Vergil Rhodes
Polyethylene Technical Service and Applications Development, Geomembrane

NOTICES

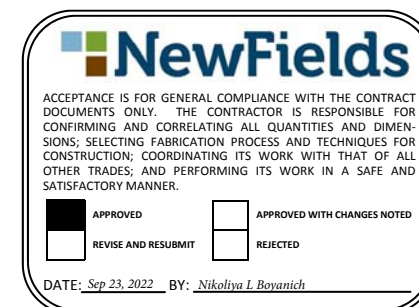
Technical Information - By using any Technical Information contained herein, Recipient agrees that said Technical Information is given by CPChem for convenience only, without any warranty or guarantee of any kind, and is accepted and used at your sole risk. Recipients are encouraged to verify independently any such information to their reasonable satisfaction. As used in this paragraph, "Technical Information" includes any technical advice, recommendations, testing, or analysis, including, without limitation, information as it may relate to the selection of a product for a specific use and application.

The following oven aging and UV exposure test methods were conducted in accordance with the GRI-GM13 (HDPE) and GRI-GM17 (LLDPE) requirements:

Test Name	Exposure Conditions	Test Method
Oven Aging	90 days in an oven at 85 °C	ASTM D5721
UV Exposure	1600 UV irradiance hours. Cycle: 20 hours UVA-340 at 75 °C followed by 4 hours dark with condensation at 60 °C. Irradiance was 0.78 W/m ² at wavelength 340 nm. Note: This implies a total UV chamber residence time of 1920 hours, e.g., 1600 hours of irradiance and 320 hours of dark/condensation.	ASTM D7238
HP-OIT	150 °C in an oxygen atmosphere at 500 psi	ASTM D5885

Oven Aging Results:

Sample	Initial HP-OIT (min)	HP-OIT after 90 days of oven aging. (min)	% HP-OIT Retained after 90 days of oven aging.	GRI-GM13 and GRI-GM17 minimum % HP-OIT requirements after 90 days of oven aging.
K307 Lot # PND821550, Agru Roll # GTC0078250016, black sheet, smooth, nominal 0.057" thick	1313	1174	89.4%	GRI-GM13: % HP-OIT: 80% minimum
7104 Lot # DNE810980, Agru Roll # GTA0077190117, black sheet, textured, nominal 0.055" thick	973	802	82.4%	GRI-GM17: % HP-OIT: 60% minimum



Continued on Page 3 - - -

NOTICES

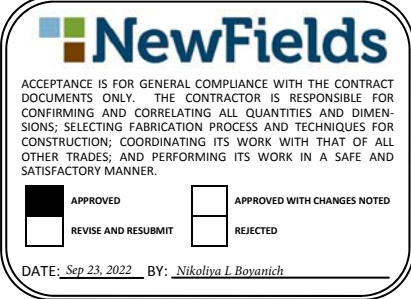
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UV Aging Results:

Sample	Initial HP-OIT (min)	HP-OIT after 1600 hrs of UV exposure. (min)	% HP-OIT Retained after 1600 hrs of UV exposure.	GRI-GM13 and GRI-GM17 minimum % HP-OIT requirements after 1600 hours of UV exposure.
K307 Lot # PND821550, Agru Roll # GTC0078250016, black sheet, smooth, nominal 0.057" thick	1313	1053	80.2%	GRI-GM13: % HP-OIT: 50% minimum
7104 Lot # DNE810980, Agru Roll # GTA0077190117, black sheet, textured, nominal 0.055" thick	973	768	78.9%	GRI-GM17: % HP-OIT: 35% minimum

Notes:

- 1600 hours of UV exposure in accordance with ASTM D7238 implies a total UV chamber residence time of 1920 hours, e.g., 1600 hours of irradiance and 320 hours of darkness with condensation.
- Sheet samples were aged with the shiny side of the sheet facing the UV bulbs.



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☒ APPROVED
 ☐ APPROVED WITH CHANGES NOTED
☐ REVISE AND RESUBMIT
 ☐ REJECTED

DATE: Sep 23, 2022 BY: Nikoliya L. Boyanich

NOTICES

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January 29, 2014

Mail To:

Grant Palmer
Agru America
500 Garrison Road
Georgetown, SC 29440

email: gp@AgruAmerica.com

Dear Mr. Palmer:

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

TRI Job Reference Number: E2386-59-09

Material(s) Tested: One Agru 80 mil Microspike LLDPE Geomembrane(s)

Test(s) Requested: 2% Secant (ASTM D5323 via ASTM D638, GM17)
Multi-axial Tensile (ASTM D 5617)

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

Sincerely,

Mansukh Patel
Laboratory Manager
Geosynthetic Services Division
www.GeosyntheticTesting.com



GEOMEMBRANE TEST RESULTS

TRI Client: Agru America

Material: Agru 80 mil Microspike LLDPE Geomembrane

Sample Identification: G14D031009 , Chevron 7104 LLDPE Resin, Resin Lot # CDG810350

TRI Log #: E2386-59-09

PARAMETER											TEST REPLICATE NUMBER											MEAN	STD. DEV.	
											1	2	3	4	5	6	7	8	9	10				
2% Secant Modulus (ASTM D5323 via ASTM D638, GM17)																								
MD 2% Secant Modulus (psi)		30887	30305	30617	32594	31327																	31146	892
MD 2% Secant Modulus (ppi)		2662	2530	2596	2533	2444																	2553	82
TD 2% Secant Modulus (psi)		35037	35745	35187	37057	34833																	35572	897
TD 2% Secant Modulus (ppi)		2950	2760	3065	2827	2675																	2855	154
Multi-axial Tensile (ASTM D 5617)																								
Test Method A: Centerpoint Deflection Versus Pressure																								
Thickness (mils)		81.0	78.0	79.0																	79.3	1.5		
Maximum Stress (psi)		1873	1781	1899																	1851	62		
% Elongation @ Rupture (%)		77.6	77.0	85.0																	79.9	4.5		
Failure Description		MDT N-EF	MDT N-EF	MDT N-EF																				
MDT	A tear in the machine direction.																							
H	Circular or elliptical hole in the specimen.																							
H-CAT	Circular or elliptical hole in an area where the material has significantly necked down or thinned. The large thinned area resembles a pupil of a cat eye.																							
N-EF	No edge failure																							
MD Machine Direction		TD Transverse Direction																						



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☒ APPROVED
☐ REVISE AND RESUBMIT

☐ APPROVED WITH CHANGES NOTED
☐ REJECTED

DATE: Sep 23, 2022 BY: Nikoliya L. Boyanich

Certificate of Analysis

Shipped To: AGRU AMERICA INC:FERNLEY
2000 Newlands Dr E
FERNLEY NV 89408-8944
USA

Recipient: PALMER
Fax:

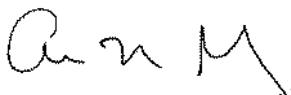
Delivery #: 80745750
PO #: 19616
Weight: 188450.000 LB
Ship Date: 08/31/2022
Package: BULK
Mode: Hopper Car
Car #: TILX624120
Seal No: 303241

Product:
MARLEX 7104 POLYETHYLENE in Bulk

Lot Number: DPH810510

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.34	g/10min
HLMI	ASTM D1238	15.10	g/10min
Pellet Count	ST-905	34	pelet/gram
Production date		20220818	
Density	D1505	0.919	g/cm3

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP (CPChem).
However, there is no warranty of any kind, either expressed or implied, applicable to its use, and the user assumes all risk and liability in connection therewith.



AMANDA ROBY
QUALITY ASSURANCE SUPERINTENDENT



ACCEPTANCE IS FOR GENERAL COMPLIANCE WITH THE CONTRACT DOCUMENTS ONLY. THE CONTRACTOR IS RESPONSIBLE FOR CONFIRMING AND CORRELATING ALL QUANTITIES AND DIMENSIONS; SELECTING FABRICATION PROCESS AND TECHNIQUES FOR CONSTRUCTION; COORDINATING ITS WORK WITH THAT OF ALL OTHER TRADES; AND PERFORMING ITS WORK IN A SAFE AND SATISFACTORY MANNER.

☒ APPROVED
☐ REVISE AND RESUBMIT

☐ APPROVED WITH CHANGES NOTED
☐ REJECTED

DATE: Sep 28, 2022 BY: Nikoliya I. Boyanich

For CoA questions contact Leslie Dziamara at +1-832-813-4806

Certificate of Analysis

Shipped To: AGRU AMERICA INC:FERNLEY
2000 Newlands Dr E
FERNLEY NV 89408-8944
USA

Recipient: PALMER
Fax:

Delivery #: 80745751
PO #: 19616
Weight: 188350.000 LB
Ship Date: 08/31/2022
Package: BULK
Mode: Hopper Car
Car #: SHPX463810
Seal No: 292597

Product:
MARLEX 7104 POLYETHYLENE in Bulk

Lot Number: DPH810490

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.31	g/10min
HLMI	ASTM D1238	14.30	g/10min
Pellet Count	ST-905	33	pelet/gram
Production date		20220818	
Density	D1505	0.919	g/cm3

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP (CPChem).
However, there is no warranty of any kind, either expressed or implied, applicable to its use, and the user assumes all risk and liability in connection therewith.



AMANDA ROBY
QUALITY ASSURANCE SUPERINTENDENT



NewFields

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☒ APPROVED
☐ REVISE AND RESUBMIT

☐ APPROVED WITH CHANGES NOTED
☐ REJECTED

DATE: Sep 28, 2022 BY: Nikoliya L. Boyanich

For CoA questions contact Leslie Dziamara at +1-832-813-4806



Vergil H. Rhodes, PE, CPlasT - Tech Svc & App Dev Engineer, Geomembranes
Highways 60 & 123, Bartlesville Research and Technology Center, Room 103 PTC
Bartlesville, OK 74003
■ 539-529-4279 ■ rhodevh@cpchem.com ■ Fax: 918-977-7599 ■ www.cpchem.com

November 12, 2021

Filename: Agru Oven and QUV Exposure for HP-OIT Testing_2021_111221.pdf

Nathan Ivy - Corporate Quality Control/Technical Manager
Agru America, Inc.
800 Rockmead #122
Kingwood, TX 77339
281-358-4741

Dear Mr. Ivy:

Please recall your request for testing of oven-exposed and UV-exposed geomembrane samples produced primarily from Marlex® 7104 LLDPE and Marlex® K307 MDPE. Agru blended other components with each of these polyethylenes to produce the geomembrane samples for testing. Geomembrane samples have been received from Agru, and test specimens were taken from the smooth areas of the samples. Test results are reported on the following two pages. The samples were tested for HP-OIT in their as-received condition and were also tested after oven and UV exposures of 90 days and 1600 hours of irradiance, respectively, in accordance with GRI-GM13 and GRI-GM17 requirements.

The following geomembrane sheet samples were received from Agru in July 2021 and were reported to be primarily composed of each of the Chevron Phillips Chemical Company grades in the description below:

- Marlex® K307 Lot # PND821550, Agru Roll # GTC0078250016, black sheet, smooth, nominal 0.057" thick.
- Marlex® 7104 Lot # DNE810980, Agru Roll # GTA0077190117, black sheet, textured, nominal 0.055" thick.

The exposure and testing conditions along with the corresponding test results are tabulated on the next two pages. GM-13 and GM-17 require a minimum % HP-OIT retention after a 90-day oven exposure and after a 1600-hour UV irradiance exposure. These test results indicate the GM-13 and GM-17 minimum % HP-OIT retentions were exceeded by the Agru-supplied K307 and 7104 sheet samples, respectively.

If you have any questions, please feel free to contact me (contact information given above).

Sincerely,

Vergil Rhodes
Polyethylene Technical Service and Applications Development, Geomembrane

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The following oven aging and UV exposure test methods were conducted in accordance with the GRI-GM13 (HDPE) and GRI-GM17 (LLDPE) requirements:

Test Name	Exposure Conditions	Test Method
Oven Aging	90 days in an oven at 85 °C	ASTM D5721
UV Exposure	1600 UV irradiance hours. Cycle: 20 hours UVA-340 at 75 °C followed by 4 hours dark with condensation at 60 °C. Irradiance was 0.78 W/m ² at wavelength 340 nm. Note: This implies a total UV chamber residence time of 1920 hours, e.g., 1600 hours of irradiance and 320 hours of dark/condensation.	ASTM D7238
HP-OIT	150 °C in an oxygen atmosphere at 500 psi	ASTM D5885

Oven Aging Results:

Sample	Initial HP-OIT (min)	HP-OIT after 90 days of oven aging. (min)	% HP-OIT Retained after 90 days of oven aging.	GRI-GM13 and GRI-GM17 minimum % HP-OIT requirements after 90 days of oven aging.
K307 Lot # PND821550, Agru Roll # GTC0078250016, black sheet, smooth, nominal 0.057" thick	1313	1174	89.4%	GRI-GM13: % HP-OIT: 80% minimum
7104 Lot # DNE810980, Agru Roll # GTA0077190117, black sheet, textured, nominal 0.055" thick	973	802	82.4%	GRI-GM17: % HP-OIT: 60% minimum



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☒ APPROVED
☐ REVISE AND RESUBMIT

☐ APPROVED WITH CHANGES NOTED
☐ REJECTED

DATE: Sep 28, 2022 BY: Nikoliya I. Boyanich

Continued on Page 3 - - -

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UV Aging Results:

Sample	Initial HP-OIT (min)	HP-OIT after 1600 hrs of UV exposure. (min)	% HP-OIT Retained after 1600 hrs of UV exposure.	GRI-GM13 and GRI-GM17 minimum % HP-OIT requirements after 1600 hours of UV exposure.
K307 Lot # PND821550, Agru Roll # GTC0078250016, black sheet, smooth, nominal 0.057" thick	1313	1053	80.2%	GRI-GM13: % HP-OIT: 50% minimum
7104 Lot # DNE810980, Agru Roll # GTA0077190117, black sheet, textured, nominal 0.055" thick	973	768	78.9%	GRI-GM17: % HP-OIT: 35% minimum

Notes:

- 1600 hours of UV exposure in accordance with ASTM D7238 implies a total UV chamber residence time of 1920 hours, e.g., 1600 hours of irradiance and 320 hours of darkness with condensation.
- Sheet samples were aged with the shiny side of the sheet facing the UV bulbs.

	
ACCEPTANCE IS FOR GENERAL COMPLIANCE WITH THE CONTRACT DOCUMENTS ONLY. THE CONTRACTOR IS RESPONSIBLE FOR CONFIRMING AND CORRELATING ALL QUANTITIES AND DIMENSIONS; SELECTING FABRICATION PROCESS AND TECHNIQUES FOR CONSTRUCTION; COORDINATING ITS WORK WITH THAT OF ALL OTHER TRADES; AND PERFORMING ITS WORK IN A SAFE AND SATISFACTORY MANNER.	
☒ APPROVED ☐ REVISE AND RESUBMIT	☐ APPROVED WITH CHANGES NOTED ☐ REJECTED
DATE: <u>Sep 28, 2022</u> BY: <u>Nikoliya L. Boyanich</u>	

NOTICES

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January 29, 2014

Mail To:

Grant Palmer
Agru America
500 Garrison Road
Georgetown, SC 29440

email: gp@AgruAmerica.com

Bill To:

<= Same

Dear Mr. Palmer:

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

TRI Job Reference Number: E2386-59-09

Material(s) Tested: One Agru 80 mil Microspike LLDPE Geomembrane(s)

Test(s) Requested: 2% Secant (ASTM D5323 via ASTM D638, GM17)
Multi-axial Tensile (ASTM D 5617)

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

Sincerely,

Mansukh Patel
Laboratory Manager
Geosynthetic Services Division
www.GeosyntheticTesting.com



GEOMEMBRANE TEST RESULTS

TRI Client: Agru America

Material: Agru 80 mil Microspike LLDPE Geomembrane

Sample Identification: G14D031009 , Chevron 7104 LLDPE Resin, Resin Lot # CDG810350

TRI Log #: E2386-59-09

PARAMETER											TEST REPLICATE NUMBER											MEAN	STD. DEV.	
											1	2	3	4	5	6	7	8	9	10				
2% Secant Modulus (ASTM D5323 via ASTM D638, GM17)																								
MD 2% Secant Modulus (psi)		30887	30305	30617	32594	31327																	31146	892
MD 2% Secant Modulus (ppi)		2662	2530	2596	2533	2444																	2553	82
TD 2% Secant Modulus (psi)		35037	35745	35187	37057	34833																	35572	897
TD 2% Secant Modulus (ppi)		2950	2760	3065	2827	2675																	2855	154
Multi-axial Tensile (ASTM D 5617)																								
Test Method A: Centerpoint Deflection Versus Pressure																								
Thickness (mils)		81.0	78.0	79.0																	79.3	1.5		
Maximum Stress (psi)		1873	1781	1899																	1851	62		
% Elongation @ Rupture (%)		77.6	77.0	85.0																	79.9	4.5		
Failure Description		MDT N-EF	MDT N-EF	MDT N-EF																				
MDT	A tear in the machine direction.																							
H	Circular or elliptical hole in the specimen.																							
H-CAT	Circular or elliptical hole in an area where the material has significantly necked down or thinned. The large thinned area resembles a pupil of a cat eye.																							
N-EF	No edge failure																							
MD Machine Direction		TD Transverse Direction																						



APPENDIX H.8 – 40-MIL HDPE GEOMEMBRANE INVENTORY CONTROL

Roll Number	Resin Lot Number	Width (ft)	Length (ft)	Area (sf)	Conformance Test	Agru QC Certification	Resin Certification	Site Delivery Date
GTD0092600002	PPA821630	23	900	20,700	X	X	X	05/16/22
GTD0092600003	PPA821630	23	900	20,700		X	X	05/16/22
GTD0092600004	PPA821630	23	900	20,700		X	X	05/16/22
GTD0092600005	PPA821630	23	900	20,700		X	X	05/16/22



APPENDIX H.9 – 40-MIL HDPE GEOMEMBRANE ROLL QC CERTIFICATES



JHL Constructors, Inc.
 Cripple Creek & Victor Gold Mine VLF2 Phase 3
 1632 County Road 82
 Cripple Creek, CO 80813

SO#:	00015086
------	----------

English							
Roll #	Width	Length	Area	Item	Count	Weight	Resin Lot #
	ft.	ft.	ft. ²			lbs.	
				FG-HDSMTH040BBBEA	4 rolls @	0 ft. ²	
GTD0092600002	23	900	20,700	FG-HDSMTH040BBBEA	1	4335	PPA821630
GTD0092600003	23	900	20,700	FG-HDSMTH040BBBEA	2	4345	PPA821630
GTD0092600004	23	900	20,700	FG-HDSMTH040BBBEA	3	4360	PPA821630
GTD0092600005	23	900	20,700	FG-HDSMTH040BBBEA	4	4355	PPA821630

82,800
 total for order



Geomembrane Quality Certification

Customer: JHL Constructors, Inc.
Project:
Destination:
Report Date: 04-May-2022 4:17 PM

S.O.# SO00015086
Item Number: FG-HDSMTH040BBBEA
Liner Type: HDPE Smooth 40mil Black Average
Roll Count: 4 (From 1 To 4)

#	Roll Number	Prod. Date	Width (ft)	Length (ft)	Area (sqft)	Weight (lb)	Resin Lot#	ASTM D5199			ASTM D8117	ASTM D792	ASTM D1248	ASTM D4218	ASTM D5596	ASTM D6693								ASTM D1004			ASTM D4833	ASTM D5397
								Thickness-Min	Thickness-Avg	OIT	Density	Melt Flow	Carbon Content	Category 1 Disp.	Tensile Yield Str (MD)	Yield Elong (MD)	Tensile Break Str (MD)	Break Elong (MD)	Tensile Yield Str (TD)	Yield Elong (TD)	Tensile Break Str (TD)	Break Elong (TD)	Tear Strength (MD)	Tear Strength (TD)	Puncture Resistance	SP-NCTL		
mil	mil	minut	g/cc	g/10	%	Categ	ppi	%	ppi	%	ppi	%	ppi	%	lb	lb	lb	hours										
1	GTD0092600002	02/28/22	23	900	20700	4335	PPA821630	39	42	165	0.947	0.26	2.3	10	126	14	206	885	113	17	200	715	43	41	105	500		
2	GTD0092600003	02/28/22	23	900	20700	4345	PPA821630	38	42	165	0.947	0.26	2.3	10	126	14	206	885	113	17	200	715	43	41	105	500		
3	GTD0092600004	02/28/22	23	900	20700	4360	PPA821630	39	42	165	0.947	0.26	2.3	10	126	14	206	885	113	17	200	715	43	41	105	500		
4	GTD0092600005	02/28/22	23	900	20700	4355	PPA821630	39	42	165	0.947	0.26	2.3	10	126	14	206	885	113	17	200	715	43	41	105	500		

Maria Coffey, Lab Manager

For Questions, Please Contact:

Lab Manager, Georgetown
Maria Coffey
843-546-0600
Ext 1063



APPENDIX H.10 – 40-MIL HDPE GEOMEMBRANE RESIN QC CERTIFICATES

Certificate of Analysis

Shipped To: AGRU AMERICA INC:GEORGETOWN
500 GARRISON RD
GEORGETOWN SC 29440
USA

Recipient: PALMER
Fax:

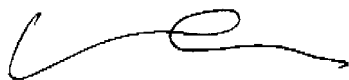
Delivery #: 80607526
PO #: 19060
Weight: 182100.000 LB
Ship Date: 02/03/2022
Package: BULK
Mode: Hopper Car
Car #: FUNX185896
Seal No: 271784

Product:
MARLEX K307 POLYETHYLENE in Bulk

Lot Number: PPA821630

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.24	g/10min
HLMI Flow Rate	ASTM D1238	23	g/10min
Density	D1505 or D4883	0.938	g/cm3
Pellet Count	PPC-SOP-0028	24	pelet/gram
Production Date		01/25/2022	

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP (CPChem).
However, there is no warranty of any kind, either expressed or implied, applicable to its use, and the user assumes all risk and liability in connection therewith.



Erin Xiao
Quality Systems Coordinator

For CoA questions contact Leslie Dziamara at +1-832-813-4806



Vergil H. Rhodes, PE, CPlasT - Tech Svc & App Dev Engineer, Geomembranes
Highways 60 & 123, Bartlesville Research and Technology Center, Room 103 PTC
Bartlesville, OK 74003
■ 539-529-4279 ■ rhodevh@cpchem.com ■ Fax: 918-977-7599 ■ www.cpchem.com

November 12, 2021

Filename: Agru Oven and QUV Exposure for HP-OIT Testing_2021_111221.pdf

Nathan Ivy - Corporate Quality Control/Technical Manager
Agru America, Inc.
800 Rockmead #122
Kingwood, TX 77339
281-358-4741

Dear Mr. Ivy:

Please recall your request for testing of oven-exposed and UV-exposed geomembrane samples produced primarily from Marlex® 7104 LLDPE and Marlex® K307 MDPE. Agru blended other components with each of these polyethylenes to produce the geomembrane samples for testing. Geomembrane samples have been received from Agru, and test specimens were taken from the smooth areas of the samples. Test results are reported on the following two pages. The samples were tested for HP-OIT in their as-received condition and were also tested after oven and UV exposures of 90 days and 1600 hours of irradiance, respectively, in accordance with GRI-GM13 and GRI-GM17 requirements.

The following geomembrane sheet samples were received from Agru in July 2021 and were reported to be primarily composed of each of the Chevron Phillips Chemical Company grades in the description below:

- Marlex® K307 Lot # PND821550, Agru Roll # GTC0078250016, black sheet, smooth, nominal 0.057" thick.
- Marlex® 7104 Lot # DNE810980, Agru Roll # GTA0077190117, black sheet, textured, nominal 0.055" thick.

The exposure and testing conditions along with the corresponding test results are tabulated on the next two pages. GM-13 and GM-17 require a minimum % HP-OIT retention after a 90-day oven exposure and after a 1600-hour UV irradiance exposure. These test results indicate the GM-13 and GM-17 minimum % HP-OIT retentions were exceeded by the Agru-supplied K307 and 7104 sheet samples, respectively.

If you have any questions, please feel free to contact me (contact information given above).

Sincerely,

Vergil Rhodes
Polyethylene Technical Service and Applications Development, Geomembrane

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The following oven aging and UV exposure test methods were conducted in accordance with the GRI-GM13 (HDPE) and GRI-GM17 (LLDPE) requirements:

Test Name	Exposure Conditions	Test Method
Oven Aging	90 days in an oven at 85 °C	ASTM D5721
UV Exposure	1600 UV irradiance hours. Cycle: 20 hours UVA-340 at 75 °C followed by 4 hours dark with condensation at 60 °C. Irradiance was 0.78 W/m ² at wavelength 340 nm. Note: This implies a total UV chamber residence time of 1920 hours, e.g., 1600 hours of irradiance and 320 hours of dark/condensation.	ASTM D7238
HP-OIT	150 °C in an oxygen atmosphere at 500 psi	ASTM D5885

Oven Aging Results:

Sample	Initial HP-OIT (min)	HP-OIT after 90 days of oven aging. (min)	% HP-OIT Retained after 90 days of oven aging.	GRI-GM13 and GRI-GM17 minimum % HP-OIT requirements after 90 days of oven aging.
K307 Lot # PND821550, Agru Roll # GTC0078250016, black sheet, smooth, nominal 0.057" thick	1313	1174	89.4%	GRI-GM13: % HP-OIT: 80% minimum
7104 Lot # DNE810980, Agru Roll # GTA0077190117, black sheet, textured, nominal 0.055" thick	973	802	82.4%	GRI-GM17: % HP-OIT: 60% minimum

Continued on Page 3 - - -

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UV Aging Results:

Sample	Initial HP-OIT (min)	HP-OIT after 1600 hrs of UV exposure. (min)	% HP-OIT Retained after 1600 hrs of UV exposure.	GRI-GM13 and GRI-GM17 minimum % HP-OIT requirements after 1600 hours of UV exposure.
K307 Lot # PND821550, Agru Roll # GTC0078250016, black sheet, smooth, nominal 0.057" thick	1313	1053	80.2%	GRI-GM13: % HP-OIT: 50% minimum
7104 Lot # DNE810980, Agru Roll # GTA0077190117, black sheet, textured, nominal 0.055" thick	973	768	78.9%	GRI-GM17: % HP-OIT: 35% minimum

Notes:

- 1600 hours of UV exposure in accordance with ASTM D7238 implies a total UV chamber residence time of 1920 hours, e.g., 1600 hours of irradiance and 320 hours of darkness with condensation.
- Sheet samples were aged with the shiny side of the sheet facing the UV bulbs.

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APPENDIX H.11 – WELDING ROD QUALITY CONTROL CERTIFICATES

WELDING ROD CERTIFICATE OF CONFORMITY

Item: FW-WR-LLDPE-BK- Weld Rod Black LLDPE 5MM
5MM

Prod Run # FNWR10089910004

Lot Number DNK810490

Date Printed: 27-Sep-2022 10:41 AM

Material FNWR10089910004

Page: 1/1

Test / Method	U of M	Results Value
Carbon Content ASTM D4218	%	2.1
Density ASTM D792	g/cc	0.931
Melt Flow ASTM D1238	g/10 min	0.36

Customer: NEWMIN
Newmont Mining

Destination:

SO #: SO00013688



Ryan Steele, Lab Manager

Production Date: 03/09/22



Certificate of Analysis

Shipped To: AGRU AMERICA INC:FERNLEY
2000 EAST NEWLANDS
FERNLEY NV 89408
USA

Recipient: PALMER
Fax:

Delivery #: 80544120
PO #: 18729
Weight: 187350.000 LB
Ship Date: 10/28/2021
Package: BULK
Mode: Hopper Car
Car #: CPCX816492
Seal No: 267520

Product:
MARLEX 7104 POLYETHYLENE in Bulk

Lot Number: DNK810490

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.36	g/10min
HLMI	ASTM D1238	17.00	g/10min
Pellet Count	ST-905	32	pelet/gram
Production date		20211015	
Density	D1505	0.920	g/cm3

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP (CPChem).
However, there is no warranty of any kind, either expressed or implied, applicable to its use, and the user assumes all risk and liability in connection therewith.

AMANDA ROBY
QUALITY ASSURANCE SUPERINTENDENT

For CoA questions contact Leslie Dziamara at +1-832-813-4806

WELDING ROD CERTIFICATE OF CONFORMITY

Item: FW-WR-LLDPE-BK- Weld Rod Black LLDPE 5MM
5MM

Prod Run # FNWR10089910005

Lot Number DNK810490

Date Printed: 27-Sep-2022 10:11 AM

Material FNWR10089910005

Page: 1/1

Test / Method	U of M	Results Value
Carbon Content ASTM D4218	%	2.2
Density ASTM D792	g/cc	0.931
Melt Flow ASTM D1238	g/10 min	0.36

Customer: NEWMIN
Newmont Mining

Destination:

SO #: SO00013688



Ryan Steele, Lab Manager

Production Date: 03/10/22



Certificate of Analysis

Shipped To: AGRU AMERICA INC:FERNLEY
2000 EAST NEWLANDS
FERNLEY NV 89408
USA

Recipient: PALMER
Fax:

Delivery #: 80544120
PO #: 18729
Weight: 187350.000 LB
Ship Date: 10/28/2021
Package: BULK
Mode: Hopper Car
Car #: CPCX816492
Seal No: 267520

Product:
MARLEX 7104 POLYETHYLENE in Bulk

Lot Number: DNK810490

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.36	g/10min
HLMI	ASTM D1238	17.00	g/10min
Pellet Count	ST-905	32	pelet/gram
Production date		20211015	
Density	D1505	0.920	g/cm3

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP (CPChem).
However, there is no warranty of any kind, either expressed or implied, applicable to its use, and the user assumes all risk and liability in connection therewith.

AMANDA ROBY
QUALITY ASSURANCE SUPERINTENDENT

For CoA questions contact Leslie Dziamara at +1-832-813-4806

WELDING ROD CERTIFICATE OF CONFORMITY

Item: FW-WR-LLDPE-BK- Weld Rod Black LLDPE 5MM
5MM

Prod Run # FNWR10089910006

Lot Number DNM810240

Date Printed: 27-Sep-2022 10:38 AM

Material FNWR10089910006

Page: 1/1

Test / Method	U of M	Results Value
Carbon Content ASTM D4218	%	2.2
Density ASTM D792	g/cc	0.933
Melt Flow ASTM D1238	g/10 min	0.35

Customer: NEWMIN
Newmont Mining

Destination:

SO #: SO00013688



Ryan Steele, Lab Manager

Production Date: 03/11/22



Certificate of Analysis

Shipped To: AGRU AMERICA INC:FERNLEY
2000 EAST NEWLANDS
FERNLEY NV 89408
USA

Recipient: PALMER
Fax:

Delivery #: 80608492
PO #: 19065
Weight: 185250.000 LB
Ship Date: 02/04/2022
Package: BULK
Mode: Hopper Car
Car #: SHQX041928
Seal No: 273863

Product:
MARLEX 7104 POLYETHYLENE in Bulk

Lot Number: DNM810240

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.35	g/10min
HLMI	ASTM D1238	14.10	g/10min
Pellet Count	ST-905	31	pelet/gram
Production date		20211104	
Density	D1505	0.920	g/cm3

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP (CPChem).
However, there is no warranty of any kind, either expressed or implied, applicable to its use, and the user assumes all risk and liability in connection therewith.

AMANDA ROBY
QUALITY ASSURANCE SUPERINTENDENT

For CoA questions contact Leslie Dziamara at +1-832-813-4806

WELDING ROD CERTIFICATE OF CONFORMITY

Item: FW-WR-LLDPE-BK- Weld Rod Black LLDPE 5MM
5MM

Prod Run # FNWR10093340003

Lot Number DNM810400

Date Printed: 27-Sep-2022 10:43 AM

Material FNWR10093340003

Page: 1/1

Test / Method	U of M	Results Value
Carbon Content ASTM D4218	%	2.3
Density ASTM D792	g/cc	0.932
Melt Flow ASTM D1238	g/10 min	0.33

Customer: NEWMIN
Newmont Mining

Destination:

SO #: SO00013688



Ryan Steele, Lab Manager

Production Date: 03/18/22



Certificate of Analysis

Shipped To: AGRU AMERICA INC:FERNLEY
2000 EAST NEWLANDS
FERNLEY NV 89408
USA

Recipient: PALMER
Fax:

Delivery #: 80608491
PO #: 19065
Weight: 187900.000 LB
Ship Date: 02/04/2022
Package: BULK
Mode: Hopper Car
Car #: CPCX817372
Seal No: 268336

Product:
MARLEX 7104 POLYETHYLENE in Bulk

Lot Number: DNM810400

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.33	g/10min
HLMI	ASTM D1238	14.30	g/10min
Pellet Count	ST-905	31	pelet/gram
Production date		20211106	
Density	D1505	0.920	g/cm3

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AMANDA ROBY
QUALITY ASSURANCE SUPERINTENDENT

For CoA questions contact Leslie Dziamara at +1-832-813-4806

WELDING ROD CERTIFICATE OF CONFORMITY

Item: FW-WR-LLDPE-BK- Weld Rod Black LLDPE 5MM
5MM

Prod Run # FNWR10100700003

Lot Number DPC810470

Date Printed: 04-Oct-2022 10:15 AM

Material FNWR10100700003

Page: 1/1

Test / Method	U of M	Results Value
Carbon Content ASTM D4218	%	2.5
Density ASTM D792	g/cc	0.935
Melt Flow ASTM D1238	g/10 min	0.36

Customer: NEWMIN
Newmont Mining

Destination:

SO #: SO00016473



Ryan Steele, Lab Manager

Production Date: 07/22/22



Certificate of Analysis

Shipped To: AGRU AMERICA INC:FERNLEY
2000 EAST NEWLANDS
FERNLEY NV 89408
USA

Recipient: PALMER
Fax:

Delivery #: 80649495
PO #: 19241
Weight: 183950.000 LB
Ship Date: 04/06/2022
Package: BULK
Mode: Hopper Car
Car #: CPCX816600
Seal No: 278667

Product:
MARLEX 7104 POLYETHYLENE in Bulk

Lot Number: DPC810470

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.36	g/10min
HLMI	ASTM D1238	14.30	g/10min
Pellet Count	ST-905	33	pelet/gram
Production date		20220315	
Density	D1505	0.919	g/cm3

The data set forth herein have been carefully compiled by Chevron Phillips Chemical Company LP (CPChem).
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AMANDA ROBY
QUALITY ASSURANCE SUPERINTENDENT

For CoA questions contact Leslie Dziamara at +1-832-813-4806

WELDING ROD CERTIFICATE OF CONFORMITY

Item: FW-WR-LLDPE-BK- Weld Rod Black LLDPE 5MM
5MM

Prod Run # FNWR10100700005

Lot Number DPC810470

Date Printed: 30-Sep-2022 10:14 AM

Material FNWR10100700005

Page: 1/1

Test / Method	U of M	Results Value
Carbon Content ASTM D4218	%	2.5
Density ASTM D792	g/cc	0.935
Melt Flow ASTM D1238	g/10 min	0.36

Customer: NEWMIN
Newmont Mining

Destination:

SO #: SO00016473



Ryan Steele, Lab Manager

Production Date: 07/27/22



Certificate of Analysis

Shipped To: AGRU AMERICA INC:FERNLEY
2000 EAST NEWLANDS
FERNLEY NV 89408
USA

Recipient: PALMER
Fax:

Delivery #: 80649495
PO #: 19241
Weight: 183950.000 LB
Ship Date: 04/06/2022
Package: BULK
Mode: Hopper Car
Car #: CPCX816600
Seal No: 278667

Product:
MARLEX 7104 POLYETHYLENE in Bulk

Lot Number: DPC810470

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.36	g/10min
HLMI	ASTM D1238	14.30	g/10min
Pellet Count	ST-905	33	pelet/gram
Production date		20220315	
Density	D1505	0.919	g/cm3

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AMANDA ROBY
QUALITY ASSURANCE SUPERINTENDENT

For CoA questions contact Leslie Dziamara at +1-832-813-4806



APPENDIX H.12 – GEOTEXTILE ROLL QUALITY CONTROL CERTIFICATES



TENCATE
GEOSYNTHETICS
North America

Mirafi® Geotextile Testing Certification

Attn: Chris Sandelli
JHL Constructors, Inc.
9100 E. Panorama Dr
Suite 300
Englewood, CO 80112

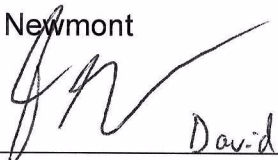
Project: Newmont
PO#: 2205
Picking Ticket #: BCS142667

This is to certify that the Mirafi S1200 Geotextile stated herein, tested at the following values:

Style Mirafi S1200	AOS U.S. Sieve	CBR Puncture	Elongation CD	Elongation MD	Water Flow Rate	Grab Tensile CD	Grab Tensile MD	Permeability	Permittivity	Thickness	Trap Tear CD	Trap Tear MD	Weight ASTM D5261	PRODUCTION & TEST DATE
Roll Number	ASTM D4751	ASTM D6241	ASTM D4632	ASTM D4632	ASTM D4491	ASTM D4632	ASTM D4632	ASTM D4491	ASTM D4491	ASTM D5199	ASTM D4533	ASTM D4533	ASTM D5261	
	#	lbs	%	%	gal/min/sf	lbs	lbs	cm/sec	sec-1	mils	lbs	lbs	oz/yd²	
J10602072	100	1086	92	79	66	410	390	.36	.9	157	153	131	12.8	3/9/2022
J10602078	100	1086	92	79	66	410	390	.36	.9	157	153	131	12.8	3/9/2022
J10602092	100	1103	94	78	66	407	385	.36	.9	171	157	135	12.7	3/9/2022
J10602118	100	1126	94	77	82	405	361	.45	1.1	158	149	126	12.3	3/9/2022
J10563403	100	1074	86	76	95	392	345	.67	1.3	203	184	137	13	4/13/2022
J10602134	100	1099	95	78	82	415	400	.45	1.1	159	178	145	12.4	4/13/2022

I hereby certify under penalty of perjury that the material listed in this Certified Test Report represents 3000 sy (quantity)

Project: Newmont


Contract Supplier - Bowman Construction Supply

01/13/2023
Date