MEMPHIS LIGHT, GAS AND WATER DIVISION

July 24, 2009

Larry Borum, Chief
Gas Pipeline Safety Division
Tennessee Regulatory Authority
400 James Robertson Parkway
Nashville TN 37243-0505

Re: Petition for Memphis Light, Gas and Water for
A Wavier to Permit the Continue Use of Plastic
Piping, which is in service and had a Storage Period
In Excess of Two Years Prior to Installation

Dear Mr. Borum:

Memphis Light, Gas and Water ("MLGW") is in receipt of your letter of June 22, 2009 requesting additional information as regards to the petition for a pipeline waiver. Please accept this as MLGW's response to the following questions:

1. Please provide a copy of the actual laboratory test data on the three (3) sections of pipe mentioned in your response.

Response: Attached hereto as Exhibit A is the test results for the three sections of pipe discussed in the original response. All tests were performed by the manufacturer, Performance Pipe.

2. In your document you state that some of the 12 inch pipe has been exposed for 10 years. It is unclear if this pipe was exposed for 9 years and some months, exactly 10 years, or 10 years and some months. Please provide information relative to the amount (length) of this 12 inch diameter pipe that has been exposed to UV rays for exactly 10 years or longer.

Response: Attached as Exhibit B is the assessment prepared by MLGW of all PE pipe for which a waiver is requested. As you will be able to see from the attached assessment, the only pipe exposed for 10 years was four feet of six inch PE pipe which is described on line 72 of the assessment form. Furthermore the "10 years" listing for that pipe is a rounded up figure. Per the specific dates previously provided on line 72, the four feet of six inch pipe installed at 0.25 psi was manufactured on September 27, 1997 and installed on May 17, 2007. Therefore it was exposed approximately nine years and four months.

No twelve inch pipe was exposed for 10 years. Per the specific dates provided on line 74, 282' of 12 inch pipe installed at 30 psi was manufactured on February 17, 1999 and installed on August 8, 2007, therefore it was exposed for approximately eight years and five months

3. Give definitive evidence of the Melt Pattern Test's validity based on scientific testing.

Response: Attached as Exhibit C is an explanation provided by Dr. Gene Palermo, whose Curriculum Vitae has been previously submitted to the TRA. Please note, MLGW is not submitting that the heat fusion test will provide definitive results regarding the integrity of PE pipe. Instead, it is a screening tool that can be used as an indicator that further tests may be needed when and if a waxy surface is noted on the PE pipe in question.

Should you require any additional information from MLGW in regard to the pipeline waiver, please do not hesitate to contact Mr. Haywood or myself.

Sincerely,

Fred E Jones, Jr.
Staff Attorney

FEJ/cw

Attachments

EXHIBIT A

PERFORMANCE PIPE

Test Results Confirmation TR1594-02 Conformance to ASTM D2513 Specifications After Extended Outdoor Storage				
Pipe Size and Type:		6" DR 11 Yellowstripe® Pipe		
Date of Manufacturing:		August 7, 1999		
Date of Testing:		October 13, 2008		
Test	Test Method	Test Value	Requirement	Result
Melt Flow	ASTM D3350 and ASTM D1238 190/5.0	3.3 g/10min	3.4 g/10min nominal	Pass (Within expected variation)
Carbon Black %	Microwave Furnace	2.17%	>2.0 %	Pass
Density	ASTM D3350 and ASTM D1505	0.955 g/cc black 0.946 g/cc natural (calculated)	0.946 g/cc natural (nominal)	Pass
Thermal Stability	ASTM D2513 and ASTM D3350	247 deg C	>220 deg C	Pass
ID Ductility	ASTM D2513 A.1.5.11.1	Pass	Pass	Pass
Ring Tensile Strength	ASTM D2513 and ASTM D2290	3660 psi Ductile	>2920 psi	Pass
80 deg C testing	ASTM D2513 A.3.2.1	670 psi	5 samples to exceed >170 hrs without failure	>200 hrs Pass

PERFORMANCE PIPE

Test Results Confirmation TR1594-02 Conformance to ASTM D2513 Specifications After Extended Outdoor Storage				
Pipe Size and Type:		1-1/4 " DR 11 Yellowstripe® Pipe		
Date of Manufacturing:		February 21, 2000		
Date of Testing:		October13, 2008		
Test	Test Method	Test Value	Requirement	Result
Melt Flow	ASTM D3350 and ASTM D1238 190/5.0	3.3 g/10min	3.4 g/10min nominal	Pass (Within expected variation)
Carbon Black %	Microwave Furnace	2.09%	>2.0 %	Pass
Density	ASTM D3350 and ASTM D1505	0.955 g/cc black 0.946 g/cc natural (calculated)	0.946 g/cc natural (nominal)	Pass
Thermal Stability	ASTM D2513 and ASTM D3350	247 deg C	>220 deg C	Pass
ID Ductility	ASTM D2513 A.1.5.11.1	Pass	Pass	Pass
Quick Burst	ASTM D2513 and ASTM D1599	Ductile	Ductile	Pass

PERFORMANCE PIPE

Test Results Confirmation TR1594-01 Conformance to ASTM D2513 Specifications After Extended Outdoor Storage				
Pipe Size and Type:	4" DR 11 Yellowstripe® Pipe			
Date of Manufacturing:	January 9, 1999			
Date of Testing:	June 18, 2008			
Test	Test Method	Test Value	Requirement	Result
Melt Flow	ASTM D3350 and ASTM D1238 190/5.0	0.3663 g/10min	0.34 g/10min nominal	Pass (Within expected variation)
Carbon Black %	Microwave Furnace	2.11%	>2.0 %	Pass
Density	ASTM D3350 and ASTM D1505	0.954 g/cc black 0.945 g/cc (natural calculated)	0.946 g/cc (nominal natural)	Pass (Within expected variation)
Thermal Stability	ASTM D2513 and ASTM D3350	245 deg C	>220 deg C	Pass
ID Ductility	ASTM D2513 A.1.5.11.1	Pass	Pass	Pass
Ring Tensile Strength	ASTM D2513 and ASTM D2290	3794 psi	>2920 psi	Pass

EXHIBIT B

2009 PE PIPE OUTDOOR EXPOSURE ASSESSMENT

2/6/2009

PE Pipe Assessment

	Search Date	Actual Install Date	Street Name	Footage 5/8"	3/4"	1"	1-1/4"	2"	4"	6"	8"	10"	12"	Printline Date	Pressure PSI	Years Exposed
1	2003	10/24/2003	2294 WHITTEN							3				11/8/2000	99	3
2	2003	9/16/2003	6441 WINCHESTER						3					1/31/1999	99	4
3	2003	9/19/2003	N SEVENTH						4					9/19/1999	99	4
4	2003	8/22/2003	3899 MACON RD					4						9/21/2000	99	3
5	2003	9/29/2003	ENTERPRISE ST					6						9/21/2000	99	3
6	2003	10/21/2003	3218 RANGE LINE RD						349					2/8/2001	99	2
7	2003	6/26/2003	OLIVER					45						1/5/2001	99	2
8	2003	7/11/2003	NELSON					602						1/5/2001	99	2
9	2003	11/10/2003	HIDDEN TRAILS	409										1/17/2001	99	2
10	2003	2/25/2003	ELZEY AVE	1914										2/12/2001	99	2
11	2003	4/21/2003	3661 OUTLAND							6				5/27/1999	99	4
12	2003	7/7/2003	MERLINS WOODS CV	63										2/13/2000	99	3
13	2003	7/7/2003	GAIL BLUFF CV	24										2/13/2000	99	3
14	2003	7/7/2003	CARCLOT LN	252										2/13/2000	99	3
15	2003	6/11/2003	BILLY MAHER RD	148										2/13/2000	99	3
16	2004	2/24/2004	4501 WHISPER RUN DR	1										5/8/2001	99	1
17	2004	9/7/2004	SHELBY DR EAST					6						6/6/2001	99	3
18	2004	6/15/2004	REBECCA WOOD DR						4					12/13/1999	99	5
19	2004	1/29/2004	CIVIC CENTER DR							940				4/20/1999	99	5
* 20	2004	1/12/2004	E. ISLAND PLACE**							942				8/7/1996	99	8
21	2004	4/6/2004	SHIRA DR						1030					7/11/2001	99	3
22	2004	8/26/2004	GILLESPIE OAK							990				12/21/1998	99	6
23	2004	10/1/2004	ELLENDALE							86				12/21/1998	99	6
24	2004	2/27/2004	CIVIC CENTER DR							1850				4/20/1999	99	5
25	2004	5/4/2004	CDS G	424										5/8/2001	99	3
26	2004	1/26/2004	WHITTEN RD	363										5/8/2001	99	3
27	2004	12/16/2004	WALNUT GROVE RD							6				12/21/1998	99	6
28	2005	9/16/2005	S. Belvedere					3						5/10/2002	99	3
29	2005	10/28/2005	Bram Bl						500					9/11/2003	99	2
30	2005	10/28/2005	Bram Bl						500					9/11/2003	99	2
31	2005	10/28/2005	Bram Bl						420					9/11/2003	99	2
32	2005	9/15/2005	Bucknell Pd						20					9/9/2003	99	2
33	2005	10/25/2005	Chena Bay	1										5/31/2002	99	3
34	2005	10/20/2005	Cash Cv				263							5/27/2000	99	5
35	2005	10/13/2005	Dexter Grove											9/11/2003	99	2
36	2005	2/6/2004	Gertrude Dr							3				7/19/2001	99	3
37	2005	9/21/2005	Knob Creek Tl					2						9/15/2003	99	2
38	2005	8/10/2005	Lexington Manor			897								4/16/2003	99	2
39	2005	12/5/2005	Parkmont						1445					9/14/2003	99	2
40	2005	10/18/2005	Reid Hooker								690			9/28/2003	99	2
41	2005	8/25/2005	Shoal Creek Ln					4						8/14/2003	99	2
42	2005	10/18/2005	Stronghaert Tl						118					9/19/2003	99	2
43	2005	10/6/2005	Walnut Grove					2						9/21/2003	99	2
44	2005	9/14/2005	Houston Levee								2497			9/1/2003	99	2
45	2005	10/18/2005	Longleaf Oak Tl						1519					9/12/2003	99	2
46	2005	9/15/2005	Maher Trail						126					9/12/2003	99	2
47	2005	10/20/2005	Nunn Cv				263							5/27/2000	99	5
48	2005	5/11/2005	Sycamore Av					90						1/8/2001	99	4
* 49	2005	8/17/2005	2475 Whitten Rd**				256							1/21/2000	99	5
50	2006	5/2/2006	Rainer Creek							36				9/1/2003	99	3
51	2006	3/23/2006	Quebec					10		400				9/1/2003	99	3
52	2006	2/27/2006	Perkins			41								8/1/2003	99	3
53	2006	9/13/2006	10149 E. Ols Browns					4						12/1/2003	99	3
54	2006	9/22/2006	Looney						4					12/1/2003	99	3
55	2006	3/28/2006	Kingsridge						2	650				9/1/2003	99	3
56	2006	10/9/2006	Greenlaw Av	120										2/1/2004	99	2
57	2006	1/26/2006	Garland Creek						930					9/1/2003	99	3
58	2006	10/6/2006	N. Fourth	40										2/1/2004	99	2
59	2006	6/26/2006	3225 Forest Hill Irene			3								8/1/2003	99	3
60	2006	5/8/2006	Forest Hill Irene								5			8/1/2003	99	3
61	2006	10/13/2006	N. Fifth	120										2/1/2004	99	2
62	2006	9/6/2006	5145 Crest Cv					4						12/1/2003	99	3
63	2006	9/20/2006	Court	36										1/1/2004	99	2
64	2006	7/12/2006	Cotton Bale Ln					4						8/1/2003	99	3
65	2006	7/27/2006	8280 Cordova					4						8/1/2003	99	3
66	2006	5/17/2006	9192 Chiswick Dr					6						8/1/2003	99	3
67	2006	5/31/2006	5099 Brian Ridge					19						8/1/2003	99	3
68	2006	5/22/2006	1994 Arden Oaks					4						8/1/2003	99	3
69	2006	10/13/2006	Appling Rd	213				1186						4/1/2004	99	2
70	2007	4/20/2007	S. Watkins					5	8					9/14/2003	99	4
71	2007	4/19/2007	Walnut Grove Rd								170			9/2/2003	99	4
72	2007	5/17/2007	Vollardine Av							4				9/27/1997	0.35	10
73	2007	8/28/2007	Trinity Rd						6					6/14/2005	99	2
74	2007	8/8/2007	Thomas St										282	2/17/1999	30	8
75	2007	6/25/2007	W. Southfield Cv.	3										9/4/2003	99	4
76	2007	4/21/2007	Sinclair Ln	3										1/9/2005	99	2
77	2007	11/6/2007	Silverman Dr						1					9/14/2003	99	4
78	2007	1/19/2007	Owen					4						12/12/2003	99	4
79	2007	6/1/2007	Overton Crossing					6						12/9/2003	99	4
80	2007	8/21/2007	Noble Oak Dr						368					9/13/2003	99	4
81	2007	10/11/2007	Nob Hill			4								8/28/2003	99	4
82	2007	3/12/2007	Maywood Oak					4						9/15/2003	99	4
83	2007	10/18/2007	Lamar Av					3						10/16/2005	99	2
84	2007	9/28/2007	LaGrange Grove Dr	5										8/26/2004	99	3
85	2007	9/21/2007	Ladur! Dr						1220					6/14/2005	99	2
86	2007	8/24/2007	Kirby Whitten Pd						5					6/15/2005	99	2
87	2007	8/2/2007	Johnson Rd						9					9/14/2002	94	5
88	2007	8/28/2007	Island Ridge Cv					245						8/6/2003	99	4
89	2007	5/23/2007	Goodbya St					3						12/7/2003	30	4
90	2007	4/24/2007	Donelson						4					9/1/2003	99	4
91	2007	7/20/2007	Decatur					3						6/23/2005	30	2
92	2007	9/14/2007	Crystal Lake					3						6/23/2005	99	2
93	2007	5/25/2007	Clifton					3						12/9/2003	99	4
94	2007	7/7/2007	Canna Hill Dr					4						12/8/2003	99	4
95	2007	7/7/2007	Canna Hill Dr						3					12/11/2003	99	4
96	2007	9/5/2007	Apple Mill					3						8/15/2003	99	4
97	2007	6/22/2007	Overton Crossing					7						6/16/2005	99	2
98	2007	12/14/2007	Plaza					4						10/16/2005	30	2
99	2008	2/7/2008	Queens College					90						6/23/2005	99	3
100	2004	5/11/2004	Sycamore					90						1/8/2001	30	5
101	2007	7/24/2007	S. Third					780						5/14/2005	30	2
102	2008	2/7/2008	Willow Walk					80						6/23/2005	99	3
103	2007	8/28/2007	Cedrick Cv					3						8/14/2003	99	4
104	2007	12/14/2007	Croft Oaks Cv				4							12/2/2005	99	2
105	2008	3/12/2008	Auction								1126			12/8/2005	30	3
106	2008	2/26/2008	N. Germantown Rd								5			12/1/2005	99	3
107	2007	12/13/2007	Loeb					2						10/16/2005	99	2
108	2007	12/6/2007	Neshoba					290						10/14/2005	99	2
			TOTALS	4,630	0	545	786	3,625	8,539	5,204	5,483	0	282			
			GRAND TOTAL	29,094												

** *Sample removed for testing*

	Search Date	Actual Install Date	Street Name	Footage 5/8"	3/4"	1"	1-1/4"	2"	4"	6"	8"	10"	12"	Printline Date	Pressure System	Years Exposed

EXHIBIT C

Palermo Plastics Pipe (P^3)
Consulting
Dr. Gene Palermo

Heat Fusion Melt Pattern Test for Black HDPE Pipe Stored Outdoors for Over Two Years From Date of Manufacture

I. Protocol

1. Select pipe in inventory that has been stored outdoors for over two years from date of manufacture.
2. Remove a one-foot sample.
3. Select appropriate saddle fusion heating iron for the size of pipe.
4. Using standard saddle fusion procedures, apply the heating iron to the pipe with the aid of a wooden block to achieve the desired force.
5. Remove heating iron after recommended time or after development of recommended bead size.
6. Immediately examine the appearance of the melt pattern and look for the presence of any wax.
7. Poke the melt pattern with a small wooden stick to determine the integrity of the melt, i.e., any signs of a waxy substance.
8. If no waxy substance is observed, the pipe is suitable for use.
9. Record results.

II. Background

This heat fusion melt pattern test was developed within the DuPont Company Pipe Laboratory as a "GO/NO GO" test to be used as an indicator if the surface of polyethylene (PE) pipe has begun to degrade as a result of exposure to ultra-violet (UV) radiation. It is based on the fact that when PE pipe is subjected to excessive outdoor storage, the UV radiation can break the carbon-carbon bonds that form the backbone of the PE molecule. The result can be a much lower molecular weight polyethylene, which is essentially a wax. The purpose of applying heat from the heating iron during this test is to visually observe this lower molecular PE, which will appear as a "waxy" substance on the pipe surface.

This test was initially used internally within the DuPont Company, and later mentioned verbally to DuPont's gas company customers. To my knowledge, there was no written protocol developed – it was simply a verbal communication about the rationale behind the test.

If colored (tan, yellow, orange) PE pipe has sufficient UV stabilizer in the formulation, this UV stabilizer will absorb the UV radiation. In this case, the PE backbone never gets attacked. If this pipe is subjected to the melt pattern test, a normal melt pattern is observed. Eventually, after continued outdoor exposure, the UV stabilizer is depleted, and the UV radiation can attack the PE carbon-carbon bonds. If this pipe is subjected to the melt pattern test, a "waxy" surface is observed from the lower molecular weight PE that resulted from the UV degradation.

In the case of black pipe, the carbon black acts as a very good UV stabilizer, and it will continue to absorb UV radiation when the pipe is stored outdoors for many years – at least 50 years according the Plastics Pipe Institute. If this black pipe is subjected to the melt pattern test, it is very likely that a normal melt pattern will always be observed because the carbon black will continue to absorb the UV radiation.