JUN 24 1997

Mr. Robert F. Smallcomb, Jr.
Director, Pipeline Engineering and Safety Division
The Commonwealth of Massachusetts
Department of Public Utilities
100 Cambridge Street
Boston, Massachusetts 02202

Dear Mr. Smallcomb:

Your letter of April 28, 1997, describes the Massachusetts Department of Public Utilities (MDPU) evaluation and approval of an application by Boston Gas Company for waiver of 49 CFR 192.321(a). This section of the Federal pipeline safety regulations requires that plastic pipe used in gas distribution service must be installed below ground level.

The waiver requests authority to install approximately 100 feet of 4-inch, 60 psig UAC 2000 polyethylene pipe in a steel casing across Bridge No. A-2-4 on Main Street in Acton, Massachusetts. This plastic pipe will be protected from both ultraviolet and mechanical damage by the steel casing pipe, while allowing for movement due to expansion and contraction.

Based on the information provided by Boston Gas Company, and your evaluation of operating conditions of the proposed installation, the Office of Pipeline Safety (OPS) concurs that the waiver will not be inconsistent with the pipeline safety regulations and will not be detrimental to public safety. For this reason, OPS will not object to the waiver as granted by the MDPU.

Sincerely,
Richard B. Felder
Associate Administrator for Pipeline Safety

The Commonwealth of Massachusetts
Department of Public Utilities
100 Cambridge Street
Boston, Massachusetts 02202

April 28, 1997

Richard B. Felder
Associate Administrator for Pipeline Safety (DPS-1)
Research and Special Programs Administration
Department of Transportation
400 Seventh Street, SW.
Washington, D.C. 20590

RE: Waiver of Pipeline Safety Regulations

Dear Mr. Felder:

Being a certified agent under section 60105, Public Law 103-272, the Massachusetts Department of Public Utilities has approved a waiver to Boston Gas Company ("Boston Gas") from the requirements of Title 49 C.F.R. Part 192, § 192.321(a). The waiver allows Boston Gas to install 105 feet of 4" nominal diameter, SDR 11.5, PE2406 plastic carrier pipe into an 8" nominal diameter, coated, welded steel casing, Both the plastic carrier and the steel casing are new pipe. Of that length, 91 feet will span a bridge and therefore, will not meet the burial requirements of § 192.321(a).

As required by section 60118(d), Public law 103-272, I am forwarding a copy of the waiver to your office with the understanding that the waiver will be effective within 60 days of notification unless the Secretary objects to the waiver in writing before the effective date. Thank you for your support in this matter.

Very truly yours,
Robert F. Smallcomb, Jr.
Director, Pipeline Engineering and Safety Division

The Commonwealth of Massachusetts
Department of Public Utilities

April 28, 1997

D.P.U. 97-34-A

Application of Boston Gas Company for approval by the Department of Public Utilities of a waiver from the requirements in 49 C.F.R. Part 192 which mandates underground installation of plastic pipe pertaining to a bridge crossing to be located in the Town of Acton, Massachusetts.

I. BACKGROUND

On March 13, 1997, Boston Gas Company ("Boston Gas"), an intrastate natural gas distribution company that operates solely in Massachusetts, requested that the Department of Public Utilities ("Department") grant a waiver of the underground installation requirements for plastic pipe contained in 49 C.F.R. Part 192 ("Part 192"). Boston Gas seeks to install 100 feet of plastic main inside a steel casing across Bridge No. A-2-4 on Main Street in Acton, Massachusetts. The bridge crosses tracks operated by the Boston and Maine Railroad.

II. REGULATORY REQUIREMENTS

The minimum federal safety standards for transportation of natural gas by pipeline are contained in Part 192. Specifically § 192.321(a) states:

(a) Plastic pipe must be installed below ground level.

Any waiver of any of the provisions of Part 192, granted by the Department, is subject to the approval of the Secretary of Transportation's Office of Pipeline Safety ("OPS"). The Massachusetts Pipeline Safety Code ("220 C.M.R. 101") and Public Law 103272, formerly the Natural Gas Pipeline Safety Act, require the Department to give OPS notice of any waiver at least 60 days before it becomes effective. The Department regulations at 220 C.M.R. 101.02(2) state:

> The D.P.U. may issue a waiver to a gas corporation or municipal gas department from the provisions of Part 192 in title 49 of the federal regulations providing that the waiver pertains to an intrastate facility and the D.P.U. gives notice to the Department of Transportation at least 60 days before the waiver becomes effective.

Public Law 103-272 states in § 60118 Compliance and Waivers:

(d) Waivers by State Authorities. If a certification under section 60105 of this title...is in effect, the state authority may waive compliance with a safety standard to which the certification...applies in the same way and to the same extent the Secretary may waive compliance .... However, the authority must give the Secretary written notice of the waiver at least 60 days before its effective date. If the Secretary makes, a written objection before the effective date of the waiver, the waiver is stayed....”

III. ANALYSIS AND FINDINGS

The proposed 4-inch nominal diameter plastic pipe is to be installed in a new casing across a new bridge. Part 192 does not allow plastic pipe to be installed aboveground. Unlike steel pipe, plastic pipe will deteriorate over time when exposed to ultraviolet radiation or temperature extremes. Buried pipe is not exposed to those conditions. Likewise, pipe sheathed within a casing is not exposed to ultraviolet radiation. Casings, located in utility bays under bridges, are shielded from sunlight, resulting in smaller temperature variations to the carrier pipe inside the casing. In 1979, OPS approved the first waiver allowing plastic pipe to be installed aboveground, inside a casing. Since then, many waivers have been granted by states and approved by OPS, including such operators as Commonwealth Gas Company (1985), Blackstone Gas Company (1994), and Bay State Gas Company (1996). All of these pipelines have operated satisfactorily.

There are advantages to the use of encased plastic pipe at this bridge crossing. First, plastic pipe is not prone to corrosion, and therefore will require less maintenance than a steel pipeline. Second, a steel-encased plastic pipe is less susceptible to damage from vandalism, airborne objects and external loading. Third, besides shielding the plastic pipe from ultraviolet radiation, the air in the steel casing acts as an insulator which stabilizes the plastic pipe from extreme temperature shifts[1]. Flowing gas temperature will tend to warm the polyethylene in the winter and cool it in the

summer. In the expected ambient temperature range, the forces acting on the plastic pipe due to expansion and contraction are well within acceptable limits since the thermal stress due to temperature variation is 1758 pounds per square inch gauge ("p.s.i.") which is well below the tensile strength of 2,600 p.s.i. for PE 2406.

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[1] Design Considerations for Plastic Bridge Crossings, Jay W. Brandli, pp 4-5, presented to the AGA Operations Conference, May 1996 compares a polyethylene pipe in or on a bridge as a complex heat exchanger (naturally convective, single pass, shell and tube). The graphics on page 5 demonstrate the moderating effect on the carrier pipe temperature on a plastic pipe encased within a steel pipe.

In addition, the following factors support Boston Gas' application. Casing spacers will be placed on the plastic pipe at intervals of five feet. These will support the pipe and allow for movement due to expansion and contraction. The steel casing shall continue past the approach slabs to approximately seven feet. The plastic pipe will be joined by butt fusion, requiring no fittings over the encased portion of the main. The maximum allowable design pressure for the plastic pipe, determined in accordance with Part 192 192.121 is 76.2 p.s.i. Boston Gas plans to operate the pipe at no greater than 60 p.s.i.

IV. ORDER

Accordingly, after due consideration, it is:

ORDERED: Boston Gas Company is hereby exempted from the underground installation requirement in 49 C.F.R. Part 192 for plastic pipe to be installed on Bridge No. A-2-4, Main Street, Acton, Massachusetts. The foregoing waiver is granted with an effective date of June 17, 1997 provided that the Secretary of Transportation or his designee does not object to the waiver prior to the effective date.

By Order of the Department,
John B. Howe, Chairman
Janet Gail Besser, Commissioner

Boston Gas Company
201 Rivermoor Street
West Roxbury, Massachusetts 02132

March 13, 1997

Mr. Robert F. Smallcomb
Director, Pipeline Engineering and Safety Division
Commonwealth of Massachusetts
Department of Public Utilities
100 Cambridge Street
Boston, MA 02202

Subject: Petition for a Waiver to Install Plastic Pipe Across Bridge No. A-2-4, Main Street (Route 27), Acton, Massachusetts

Dear Mr. Smallcornb:

In accordance with 220 CMR 101.02: Application for Exceptions and Waivers from Provisions of the D. P. U. Regulation, Boston Gas Company (the "Company") hereby petitions the Massachusetts Department of Public Utilities (the "Department") for a waiver from the provision of 49 CFR 192.321, Installation .of Plastic Pipe, paragraph (a). Paragraph (a) requires that plastic pipe must be installed below ground level.

The Company proposes to install approximately 100 feet of 4-inch nominal diameter, SDR 11.5, PE 2406, plastic pipe above ground level across the above-captioned bridge. The bridge spans the Boston and Maine Railroad. The pipeline will be a new main that will be inserted in a new casing across a new bridge_

The pipeline will be joined by heat fusion and inserted in an 8-inch nominal diameter, coated, welded, steel casing. The pipeline will be tested in accordance with Massachusetts and federal regulations so that it may be operated at 60 psig.

The specifications for the plastic pipe appear as Table 1 and Table 2 in Exhibit A; and the specifications for the casing appear as Table 1 in Exhibit B. The design of the pipeline installation across the bridge, including, but not limited to, the carrier pipe and casing supports, the number of supports, the distance between supports, and the means for maintaining a separation between the plastic pipe and the metallic casing appears in Exhibit C. In accordance with 220 CMR 101.06(10)(a)6, a 4-inch, plastic valve will be located on each side of the bridge, at the approximate distances shown in Exhibit C.

The stress on the plastic pipe will not exceed the pipe's yield strength of 3,000 psig presented in Exhibit A, Table 1 because the anticipated temperature that the pipe will experience after installation is not less than -20°F, nor greater than 100°F. The anticipated temperature of the plastic pipe at the time of its installation will be between 40°F and 60°F. Therefore, the plastic pipe will not be exposed to excessive thermal stresses, the deteriorating affects of ultraviolet light from the sun, or mechanical damage under normal operating conditions. Consequently, the Company believes that there is no safety hazard associated with the installation of the plastic pipe above ground level across the bridge, as described herein.

If you have any questions or require additional information to be submitted regarding this petition, please contact me at 723-5512, Ext. 4247, or the above address.

Very truly yours,
Peter Calderazzo, P.E. Project Engineer
Engineering Services

EXHIBIT A
Plastic Pipe Specifications

TABLE 1
Physical Property Data For UAC 2000 Polyethylene Pipe

PE 2406

Property	Nominal Value
Melt Index	0.2 g/10 min
Density	0.943 g/cc
Thermal Expansion	9×10^{-5} in/in/°F
Yield Strength	3,000 psi
Flexular Modulus	100,000 psi
Thermal Conductivity	1.8 Btu/hr/sq ft/°F/in
Hydrostatic Design Basis @73°F	1,250 psi
Deflection Temperature @ 68 psi	140°F
Vicat Softening Point	248°F
Brittleness Temperature	<-180°F
Hardness, shore D	64
Flammability	1 in/min
Ultimate Elongation	>800%

TABLE 2

Plastic Pipe Data – PE 2406

Nominal Pipe Size (inches)	Standard Dimension Ratio (SDR)[1]	Average Outside Diameter (inches)	Average Inside Diameter (Inches)	Minimum Wall Thickness (Inches)	Design Pressure Rating @ 100°F(psi)
2	11.0	2.375	1.917	0.216	80
3	11.5	3.500	2.856	0.301	76
4	11.5	4.500	3.672	0.391	76
6	11.5	6.625	5.403	0.576	76
8	13.5	8.625	7.270	0.639	64
12	13.5	12.750	10.749	0.945	64

[1] SDR, Standard Dimension Ratio, is calculated by dividing the average outside diameter of the pipe by the minimum wall thickness as described in ASTM D2513.

EXHIBIT B

Casing Specifications

TABLE 1

Specifications for Casing Pipe
TYPE OF PIPE: API 5L, Grade B

Property, Dimension, or Specification	
Nominal Pipe Size:	8 in.
Outside Diameter:	8.625 in.
Inside Diameter	8.125 in.
Wall Thickness:	0.250 in.
Schedule Number	20
Weight per foot:	22.36 lb
Coating:	Pritec high molecular polyethylene outer coating with butyl rubber adhesive

EXHIBIT C

Installation Design

Drawing No. P-100

Huriaux, Riachard

From: Miller, Kate
To: Huriaux, Richard
Subject: Boston Gas Waiver
Date: Friday, May 30, 1997 01:40p

On April 28, 1997, Bob Smallcomb of the MA DPU sent a waiver request for Boston Gas to install plastic pipe inside a casing on a bridge. I calculate a response will be due from OPS by June 28, 1997. Please send the Eastern Region a copy of the response letter when it is sent to MA DPU.