

U.S. Department of Transportation
Research and Special Programs Administration
400 Seventh St., S.W.
Washington, D.C. 20590

JUN 23 2002

Mr. Terry Fronterhouse
Chief of Pipeline Safety Pipeline Safety Section
Arizona Corporation Commission
1200 West Washington Street
Phoenix, AZ 85007-2996

Dear Mr. Fronterhouse:

We have considered your letter of February 20, 2002, notifying us that the Commission has granted the City of Mesa a waiver from complying with 49 CFR 192.123(a)(1). The waiver enables the City of Mesa to participate in a field test of new technologies sponsored by the Gas Technology Institute.

Section 192.123(01) limits the design pressure of plastic pipe in distribution systems to 100 psig. The waiver allows the City of Mesa to operate up to one mile of 2-inch polyamide 11 plastic piping at 102 psig for 4 years in its Magma Gas System, subject to certain installation and maintenance conditions.

We have no objection to the waiver. The circumstances are comparable to those of an Illinois Commerce Commission waiver we approved April 20, 1999, allowing Nicor Gas to operate polyamide 11 plastic piping at 160 psig during a trial period.

Sincerely,
Stacey Gerard
Associate Administrator for Pipeline Safety

ARIZONA CORPORATION COMMISSION

February 20, 2002

CERTIFIED MAIL

Ms. Stacy Gerard
Associate Administrator for Pipeline Safety
U.S. Department of Transportation
400 Seventh Street, SW, Room 7128
Washington, DC 20509

RE: CITY OF MESA WAIVER REQUEST, INSTALLATION OF POLYAMINE 11 NATURAL GAS PLASTIC PIPE

Dear Ms. Gerard:

Enclosed find a copy of the City of Mesa's request for waiver from the requirements of Title 49 CFR Part 192.123 for the installation of polyamide 11 (PA11) natural gas plastic piping.

The Arizona Corporation Commission's Office of Pipeline Safety (Commission) has reviewed this request and has approved it at the state level with stipulations. We feel that by granting this waiver there will be no compromise of safety. It is now being forwarded to your office for review.

The Commission has advised the City of Mesa of our action at the State level We have also advised the City of Mesa that this waiver must be forwarded to the Federal Office of Pipeline Safety for review and that the waiver approval shall not take place until your office has had an opportunity to review it and we advise them of your approval or rejection of the waiver.

Should you have any questions regarding this matter, please contact Corky Hanson at (602) 542-3316.

Sincerely,
Terry Fronterhouse
Chief of Pipeline Safety Pipeline Safety Section

ARIZONA CORPORATION COMMISSION

February 20, 2002

Mr. Gerald E. Paulus
Gas Division Director
City of Mesa
640 North Mesa Drive
Mesa, Arizona 85211-1466

RE: WAIVER REQUEST, FOR INSTALLATION OF POLYAMIDE 11 (PA11) NATURAL GAS PLASTIC PIPING

Dear Mr. Paulus:

The Arizona Corporation Commission's Office of Pipeline Safety (Commission) has completed its review of the City of Mesa's request for waiver from Part 192.123 to allow the use of PA11 natural gas piping for an ongoing test in a class one (1) location for a test period not to exceed four (4) years as outlined in your request dated January 15, 2002.

The City of Mesa waiver has been approved at this level with the following stipulations:

- The size of pipe be two inch (2") in diameter and with approved transition fittings.
- The PA11 to be installed in the Magma Gas System, a class one (1) location and that the overall length of this installation shall not exceed one (1) mile in length.
- The depth of cover to be a minimum of four (4) feet and all transitions from that depth shall be by way of anodeless risers approved for use with PA11 material.
- Warning tape shall be placed at least one foot above the installed pipe the full length of the installation.
- Installation shall be by open trench only.
- A minimum of six (6) inches of screened shading material of 3/8 inch minus shall be provided below, above and on the sides of the installed pipe.
- Hot tapping shall not be permitted on the installed Pa11 pipe.
- Leak surveys shall be conducted as outlined in your waiver request, a copy of these leak surveys shall be submitted to the Commission within one (1) month of having been conducted.
- The PA11 pipe material will be installed in the class one (1) location, however, should the class location change to greater than a class two (2), the City of Mesa shall conduct a leakage survey in the affected location at least every six (6) months or lower the operating pressure to a pressure not to exceed 60 psig.
- Installation shall be to specific qualified written procedures for each size joint utilized by qualified installers and inspected by qualified inspectors other than the installation crew.
- This test period shall be restricted to a four year timeframe at the end of the four years at least three (3) sections of PA11 pipe shall be removed from the pipeline at random location and submitted to an independent lab for evaluation. A copy of the evaluation shall be submitted within 30 days of the City of Mesa receiving the results.
- The City of Mesa shall notify by telephone via regular telephone incident reporting requirements and shall submit a report in writing to the Commission all reported hits, damages and leaks detected along with details involving each incident and how repairs were made. Written reports shall be submitted at least every six (6) months.
- The operating pressure shall be limited to 102 psig on the PA11 pipeline.
- Any additional installation of Pa11 pipe or increase in pressure above 102 psig shall be beyond the scope of this waiver and therefore shall be submitted to the Commission for consideration through the waiver

process.

This approval has been forwarded to the Federal Office of Pipeline Safety (OPS) for their review. This approval shall not take place until the OPS has had opportunity for review and we will advise you of their action taken.

Thank you for your continued support of the Pipeline Safety Program. Should you have any question, please feel free to contact Corky Hanson at (602) 542-3316.

Sincerely,
Terry Fronterhouse
Chief of Pipeline Safety
Pipeline Safety Section

City of Mesa

January 15, 2002

Mr. Terry Fronterhouse
Chief, Pipeline Safety Utilities Division
Arizona Corporation Commission
1200 West Washington
Phoenix, Arizona 85007

Re: Waiver Request for the Installation of Polyamide 11 (PA 11) Natural Gas Plastic Piping.

Mr. Fronterhouse:

The City of Mesa, Arizona is the owner of a natural gas system, providing safe and efficient energy resources to over 35,000 customers in the City of Mesa and Magma Gas Systems. The City of Mesa, operates and maintains over 900 miles of distribution mains and services, with operating pressures from 20 to 250 psig in diameters 12" through 8".

In an effort to advance promising technologies in the natural gas industry, the City of Mesa, has been asked by the Gas Technology Institute to field test SDR 11 Polyamide 11 (PAI I, a Rilsan nylon, polymer based, thermoplastic pipe). The City of Mesa respectfully requests a waiver from §192.123 to allow the use of PAI I piping system for an ongoing test in a class I location within the City of Mesa's Magma Gas System. This waiver will allow:

- The City of Mesa to install ?All in the maintenance upgrade of a section of steel gas main.
- A maximum design pressure in excess of 100 psig for SDR 11 PAI I piping system as limited by its HDB rating at 140°F and using a design factor of 0.32 in the formula contained within §192.121, as shown in Attachment 1
- To operate this section of PA1 I piping at 102 psig.
- A period of four (4) years to be used in the referenced class 1 Location (Attachment 2), to assess the basis for revising §192.123 for Polyamide 11 pipe. At the end of the four-(4) year test period the mainline pressure will be lowered to not more than 60 PSIG.

The following discussion sets forth the reasons why §192.123 should be waived by the Commission and what measures the City of Mesa shall use to ensure that gas pipeline safety will not be compromised.

The City of Mesa proposes the installation to occur in a class 1 location, in the Magma Gas System owned and operated by the City of Mesa, on Felix Road, north of Arizona Farms Road, as designated in the attached system maps (Attachment 2). The City of Mesa will terminate the PAH via a service riser and pressure regulator located at the property line. The pressure will be reduced at the property line to not more than 15 psig. PA1 I piping will be used for distribution main purposes only.

The City of Mesa proposes that the upper pressure limits in §192.123 be raised to, 102 psig for PA1 1 pipe material. PA11 has been approved under ASTM D2513-96a with a Hydrostatic Design Basis (HDB) rating of 1600psi at 140°F. The HDB rating for PA11 was established after long and exhaustive tests conducted in conjunction with the Plastics Pipe Institute (PPI). Additionally, a third party testing and evaluation of the PA11 material corroborates the material's strength, integrity, and performance.

The basis for this waiver has been studied for several years and adequate tests have been conducted to verify that this waiver is justified. The Attachments to follow and the supplemental information provided show the adequacy of these

alternative standards. This waiver will assure that the regulations are kept current with advancing pipeline technology in conformance with the continuing goals of the Regulatory Reinvention Initiative conducted by the OPS in 1995-1997.

The City of Mesa proposes to use PAI I piping system in accordance with City of Mesa approved installation and quality assurance procedures specified for plastic piping in its City of Mesa Operations, Maintenance, and Emergency Response Manual. These standard operating procedures are on file with the Arizona Corporation Commission and are audited annually by the Commission for compliance to Part 192 requirements. The following records will be maintained regarding the use of this pipe: type of material, locations, length, pressure, pipe size, wall thickness, environmental conditions, lot number, and class location.

In order to assure adequate safety to the application of this waiver, the City of Mesa proposes to pressure test the newly installed pipe at 150 percent of the maximum operating pressure under the requirements set for the in §192.513. Also, the City of Mesa shall conform to all other related requirements stated in § 192.191, which ensure that the thermoplastic fittings that are used conform to ASTM D2513; §192.281, §192.285, and §192.287, which ensures the safety of joints by using approved procedures and qualified joiners and inspected by qualified inspectors. The City of Mesa will maintain appropriate signage per approved City of Mesa procedures. Additional line markers will be installed every 150 feet along the installation site. Finally, the City of Mesa proposes to conduct a leak survey of the installed PA11 pipe twice the first year and then on an annual basis.

For further information on PA11 piping materials and, its use in natural gas distribution systems please refer to the included final reports (Parts I-II-III) from the Gas Research Institute, *"Technical Reference on the Physical, Mechanical, and Chemical Properties of PA11 Pipe Materials for Use in Gas Distribution Systems Operating at Higher Pressures and Temperatures"*, *"Evaluation of PA11 Piping for Use in Gas Distribution Systems Operating at High Pressures and Temperatures and Field Installation"*, *"Aging Characteristic Evaluation of PA11 Piping for Use in Gas Distribution Systems Operating at High Pressures and Temperatures"*, and *"Technical Reference Summary, Safe and Reliable Use of PA11 Gas Distribution Systems Operating at Higher Pressures (160-200 psig)."*

Thank you for your consideration of this waiver request. The City of Mesa looks forward to partnering with the Arizona Corporation Commission in the advancement of promising technologies in the natural gas industry, and creating opportunities to bring our customers a safe and reliable energy source. If you have any questions please contact Gerald Paulus at 480-644-2872 or Michael Comstock at 480-644-2,490.

Sincerely,
Gerald Paulus
Gas Division Director
City of Mesa, Arizona

Attachment 1

Design Calculation per Section 192.121
MAOP (psig)

(Design Factor, $F_D = .32$)

SDR	PA11 Design Pressure, psig (HBD = 1600 psi at 140°F)
32.5	33
26	41
21	51
17	64
13.5	82
11	102
9	128
7	171

SAMPLE CALCULATION

$$P = 2St/(D-t) * d_f \quad \text{or} \quad P = 2S/(SDR-1) * d_f$$

Where: P = Design pressure, gage, kPa (psi)
S = For thermoplastic pipe the long-term hydrostatic strength determined in accordance with the listed specification at a temperature equal to 23°C (73°F), 38°C (100°F), 49°C (120°F), or 60°C (140°F); for reinforced thermosetting plastic pipe, 75,800 kPa (11,000 psi).
SDR = Standard Dimension ration defined as the ratio of the nominal outside diameter to the standard wall thickness.
 d_f = design factor

Therefore: PA11 SDR 11 pipe with $S = 1600$ psi (140°F) and $d_f = 0.32$

$$P = 2(1600)/(11-1) * 0.32 = 102 \text{ psig}$$