

February 4, 2003

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

Mr. S. Kent Evans
Lead Pipeline Safety Engineer
State of Utah, Department of Commerce
Division of Public Utilities
160 East 300 South
Salt Lake City, Utah 84114-6751

Dear Mr. Evans:

We have considered your letter of October 10, 2002, notifying the Office of Pipeline Safety (OPS) that the Utah Public Service Commission (UPSC) has approved as amended, the application of the Questar Gas Company for a waiver from the requirements of Title 49 CFR §§ 192.121 and 192.123(a).

The waiver would permit Questar to use polyamide resin (also known as Nylon 11, PA 11, or Rilsan™) as a piping material to distribute natural gas at operating pressures up to 200 psig. The waiver allows a Plastic Pipe Hydrostatic Design Basis design factor of 0.40 and requires the use of the design formula contained within § 192.121.

Based on your letter and the supporting information provided by Questar, the following is our understanding of the critical issues:

1. Questar will install defect free Pa11 plastic pipe in accordance with written procedures submitted to the UPSC. The installation of PA11 plastic pipe will be in class 1, 2, or 3 locations and consist of 1-inch and 2-inch IPS service and main line tubing.
2. The maximum allowable operating pressure for this piping system will be limited to 200 psig in class 1 locations. If subsequent installations of PA11 pipe are to be made in class 2 or 3 areas, the maximum allowable operating pressure for the piping system will be limited to 160 psig. OPS concurs with the UPSC's reasoning that the information provided from a 0.40 design factor will provide valuable operational and plastic pipe design information to both the regulatory and industry community alike.
3. The UPSC order indicates that the Division of Public Utilities pipeline safety staff will be present during the installation of all service lines, hot taps, and removal of test coupons. Only SDR 11 mechanical tap tees will be used while performing hot taps on PA11 plastic pipe material.
4. Questar will remove sections of the PA 11 plastic pipe for testing and evaluation at twelve (12) and twenty-four (24) month periods from the date of installation. Tests will be performed with the Gas Technology Institute (GTI) to insure that the PA11 plastic pipe continues to be free from defects and meet the requirements of ASTM D2513-96a. If test results indicate that the PA11 plastic pipe material does not continue to meet the requirements of ASTM D2513-96a , it will be reduced in maximum allowable operating pressure, abandoned, or replaced, with a suitable material.

The results of the tests will be filed with the UPSC and made available to OPS upon request.

The Gas Technology Institute (GTI) is advocating a rule change that would allow for the permanent installation of PA 11 plastic pipe and allow operators to operate plastic pipelines above 100 psig. Through the waiver process, this office, as well as GTI, is gathering operational data regarding the performance of PA 11 plastic pipe. We agree with the

intent of this waiver, however, we recommend that it be modified to require periodic testing of the pipeline for the duration of the waiver. We further recommend that future waivers of this type be approved for a temporary time period and not on a permanent basis as was done in this case.

Sincerely,
Stacey L. Gerard
Associate Administrator
for Pipeline Safety

Reynolds, James

Sent: Tuesday, January 07, 2003 9:27 AM
To: Reynolds, James
Subject: RE: utahPA11revl .wpd

Thanks James, good job!

-----Original Message -----

From: Reynolds, James
Sent: Tuesday, January 07, 2003 8:23 AM
To: Sanders, Richard
Cc: Daugherty, Linda (OPS-HQ)
Subject: RE: utahPAllrevl.wpd

Richard,

Thanks for your comments (and they are worth more than two cents) regarding the Utah waiver for the use of PA 11 plastic pipe. Because you may not be aware of some of the specifics of the Utah waiver, let me share the following with you. If you are aware of the specifics, forgive me:

- With respect to your comment #2 below: The waiver specifies that the design factor in class 3 will be 0.32.
- With respect to your comment #3 below: The waiver specifies, "Only SDR 11 mechanical tap tees will be used while performing hot taps on PA 11 plastic pipe material." Although, as you suggest in you comment, SDR 11 or greater wall thickness may be acceptable, the Commission has approved only SDR 11 for use in this pipeline project.
- With respect to your comment #4 below: 1). The waiver specifies that the pressure in the pipeline will not be lowered --provided test results continue to meet the requirements of ASTM D2513-96a; 2). The waiver specifies, "If test results indicate that the PA11 plastic pipe material does not continue to meet the requirements of ASTM D2513-96a, it will be reduced in maximum allowable operating pressure, abandoned, or replaced, with a suitable material."; 3). The waiver specifies that test will be performed according to the testing requirements of ASTM D2513-9a; 4). The last sentence of the OPS response to the waiver recommends an annual testing program for the duration of the waiver. This recommendation is put forth by OPS because the Commission has approved (and OPS did not object within 60 days - my error) for the operating pressure of the pipeline to be greater than 100 psig for the duration of the waiver.
- Lastly, previous waivers specify that tests results will be made available to OPS upon request. Unless OPS is willing to committ employee resourses to study these tests results and make recommendations on its findings, I fear that these documents will only sit in a file collecting dust (if required to be sent to OPS).

I hope I have addressed each of your comments to your satisfaction. James

----- Original Message

From: Sanders, Richard
Sent: Sunday, January 05, 2003 10:22 PM
To: Daugherty, Linda (OPS-HQ); Reynolds, James
Subject: utahPAllrevl.wpd

My two cents worth!

State of Utah
DEPARTMENT OF COMMERCE
Heber M. Wells Building 4th Floor
160 East 300 South / Box 146751
Salt Lake City, Utah 84114-6751

October 10, 2002

Ms. Stacey Gerard, Associate Administrator
US Department of Transportation
RSPA/Office of Pipeline Safety
400 7th Street, SW Room 7128
Washington, DC 20590

RE: Questar Gas Company Request for Waiver of 49 CFR 192.121 and 192.123(a). UPSC Docket Number 02-057-07.

Dear Ms. Gerard:

Please find enclosed the order of the Utah Public Service Commission (UPSC) in the referenced matter. We are submitting the order and the Questar Gas Company (QGC) petition for review and action in accordance with 49 USC 60118(a). QGC requests action on this matter to allow installation of the proposed PA11 pipe in a Class 1 area most likely near Vernal, Utah. The final site will be determined in consultation with Division of Public Utilities pipeline safety personnel.

As we were preparing our response to you we became aware of the additional material requested by OPS from the Tennessee Regulatory Authority (TRA) regarding their recent request for a waiver for a PA 11 pipe installation in Tennessee. We have received their permission to refer to that material in our response. Therefore we will respond directly to the questions asked of TRA in this request for your consideration of the petition by QGC for a waiver of 49 CFR 192.121 and 192.123(a) for a similar installation of PA 11 pipe in Utah. Questions from your office to the TRA and our response thereto are provided below.

1. Please indicate the diameters of the PA1 1 plastic pipe to be used in the main and service lines.
Pipe to be used will be 1" and 2" IPS. Flow requirements will dictate the size needed for individual customers.
2. Please indicate the SDR numbers of the PA11 plastic pipe to be used in the main and service lines.
All PA11 pipe as well as any butt fusion fittings will be SDR 11.
3. Please indicate the class location of the main and service lines. The PA11 pipe installed with an MAOP of 200 psig will be in a class 1 location. If subsequent installations of PAI I pipe were to be made in Class 2 or 3 areas, the MAOP would be 160 psi.
4. Please indicate if the waiver is permanent or only for a trial period in conjunction with the Gas Technology Institute study. If the latter, please indicate the length of the trial period.

The waiver is intended to be permanent. Questar will take additional precautions for a prescribed time frame as outlined in the enclosed waiver letter. After validating the results from GTI that the pipe is free from defects and meets ASTM D2513-96a requirements, the installation will be permanent and maintained as any other high-pressure system. Otherwise, based on the results from the data, the MAOP will be dropped below 100 psig; the pipe will be abandoned, or replaced with a suitable material.

5. Please indicate if hot taps are to be performed on the PA11 plastic pipe.

Heat-fusion or Electro-fusion saddle tapping tees will NOT be permitted on PA11 pipe. However mechanical tapping tees will be used for providing service to additional customers as needed.

6. Please indicate if the Division of Public Utilities pipeline safety staff will be present periodically during the installation of the PA11 plastic pipe.

The Utah Public Service Commission's order states the following: "Questar is to provide sufficient notification to the Division of Public Utilities pipeline safety personnel to afford the Division the opportunity to be present during the installation and testing of the PA-11 pipe.

Pipeline safety staff will be present periodically to observe the installation.

7. Please indicate why the Division of Public Utilities pipeline safety staff believes it is safe to use a design factor of 0.40 instead of 0.32 to determine the design pressure of PA11 plastic pipe.

A design factor of 0.40 may only be used in a class 1 location, otherwise the design factor of 0.32 must be used. This will provide needed test data while ensuring that the data is being gathered in the safest environment possible with regards to population density.

In addition to the waiver letter and technical reference, the reasons for allowing the use of a 0.40 design factor are as follows:

Improved materials and Quality control. Resins utilized in the production of plastic pipe today perform better under stress compared to materials of the 60's and 70's. Manufacturing processes have improved through the years so that plastic pipe is produced with much closer tolerances than "vintage" pipe of 30 years ago.

Accepted under other standards. The Canadian Standards Association (CSA) has recently adopted a design factor of 0.40. The International Standards Organization (ISO) assigns design stresses of 580 psig and 725 psig to medium density (MDPE) and high density (HDPE). These values are equivalent to design factors of 0.48 and 0.45 for MDPE and HDPE respectively. A design factor of 0.50 has been an accepted practice in the United States for design of thermoplastic pipe in water applications.

Design factor basis. The original Section 192.121 of the Minimum Federal Safety Standards included design factors based on class location. Design factors of 0.32 for class 1, 0.25 for class 2 & 3, and 0.20 for class 4 were the accepted standards. In 1978, amendment 192-31 combined these factors into a single standard for all class locations (0.32). At that time, several comments were made to the proposed rule change in support of a common 0.40 design factor based on many years of satisfactory use prior to the adoption of Section 192.121.

Continuing studies. PA11 gas piping material has been studied extensively under laboratory and field conditions to characterize its integrity under various failure modes. Gas Technology Institute in conjunction with Nicor has compiled data pertaining to short-term ductile and long-term slow crack growth failures in PAZ 1 piping material. Nicor established two pilot projects with operating pressure of 150 psig or more and has proven PA11 material's ability to withstand higher operating pressures.

QGC will install and monitor the PA11 pipe and any associated equipment in accordance with the provisions outlined in its proposal to the UPSC and in accordance with the enclosed order of the UPSC. We will review all records regarding the use of the pipe as it applies to material, length, pressure test, pipe size, wall thickness, environmental conditions, class location, and qualifying procedures for joining of the material. As specified in QGC's petition, we will monitor the removal of cross-sections of the PA11 pipe at twelve (12) and twenty-four (24) month periods from the date of

installation. The results of tests performed on these removal specimens will be filed with our agency and made available to the Office of Pipeline Safety on request.

The UPSC order provides for a twenty (20) day period following the date of the Order in which an aggrieved party may file a written request for reconsideration by the Commission. Failure to file such a request precludes judicial review of the Order and the Order becomes effective. At the close of business on August 22, 2002 no filings had been received by the UPSC from any aggrieved party, so the Order is now in effect.

If the UPSC does not receive a response from the Federal Office of Pipeline Safety within sixty days of receipt of the order, we understand that QGC will be free to proceed under the provisions of the order. If you have any questions regarding this matter, please contact Sandy Mooy, legal counsel for the UPSC at 801-530-6708 or me at 801-530-6667. Your prompt response to this request is appreciated..

Sincerely,
S. Kent Evans
Lead Pipeline Safety Engineer
Utah Division of Public Utilities
Enclosure

Questar Gas Company
1140 West 200 South
P.O. Box 45360
Salt Lake City, UT 84145-0360

March 21, 2002

Dr. Kent Evans, Ph.D.
Lead Pipeline Safety Engineer
Utah Division of Public Utilities
Heber M. Wells Building
160 East 300 South
P.O. Box 146751
Salt Lake City, Utah 84114-6751

RE: Waiver Request – PA11 High Pressure Pipe Demonstration Project

Dear Kent:

Questar Gas Company (Questar) has a strong interest in continuing to explore new opportunities for distributing gas safely, reliably and economically. Questar has been working with the Gas Technology Institute (GTI) for several months on the possibility of conducting a demonstration project for a new type of high pressure plastic pipe, Polyamide 11 (PA11). With your assistance, Questar would like to commence the regulatory process to obtain the necessary waivers from provisions of the Utah Public Service Commission (Commission) regulations on pipeline safety (R746-409) to enable this project. Further, we wish to enlist the support of your office in verifying the suitability of a candidate site (or sites) for the demonstration project.

Proposed Scope of Project

Questar proposes the installation of up to fifteen (15) miles of PA11 pipe within Questar's service territory in Utah for purposes of demonstrating the viability of the new pipe technology. Pa11 has the potential to replace steel in certain higher pressure applications, and thus holds interest as a promising new technology. PA11, also known as Nylon 11 or Rilsan™, is manufactured from a polyamide resin material.

In order to operate Pa11 pipe at pressures greater than 100 psig, a waiver from both §192.121 and §192.123(a) in Part 192 of U.S.C. Title 49 needs to be granted.¹ Questar envisions a two-step regulatory review process:

- A waiver from the Commission is sought and obtained in order to allow the PA11 demonstration project.²
- Final siting for the demonstration project, not to exceed 15 miles of PA11 pipe, is determined by Questar Gas in consultation with the Division of Public Utilities pipeline safety staff.

Questar requests that the PA11 piping system be allowed to operate at pressures greater than 100 psig, as limited by its dimensions and the material's inherent long-term strength as represented by its established Plastic Pipe Institute (PPI) Hydrostatic Design Basis (HDB) rating. Specifically, Questar requests a maximum design pressure of 200 psig for the proposed PA11 SDR 11 piping system as limited by its HDB rating of 2500 psi and a 0.40 design factor³ in the design formula within § 192.121.

¹ - 49 CFR Part 192, as amended on November 3, 2000, is adopted and incorporated by reference into Commission rules at R746-409-I .B.

² – Per our recent discussions and based on the process used previously for the Clock Spring waiver, Questar Gas is initiating the waiver request process through a request letter rather than a formal pleading.

³ - §192.121 contains a 0.32 design factor

Supporting Information and Data

The following discussion sets forth the reasons why the requested § 192.121 and § 192.123 (a) waivers should be allowed by the Commission and the U.S. Department of Transportation, Office of Pipeline Safety (OPS). Supporting material can be found in the enclosed PA11 waiver package. The waiver support materials include the following:

- Technical Reference Summary
- Video Tape
- CD-ROM
- GRI Final Report - Part I, II, and HI

Questar proposes that the pressure limits in §192.123(a) be raised to allow the use of SDR 11 PAH piping systems at pressures greater than 100 psig for the purposes of this demonstration project. PA11 has been approved for use in gas distribution systems under ASTM D2513-96a Annex A5. In addition to satisfying all of the short-term and operational requirements of ASTM D 2513, PA 11 has greater long-term strength characteristics as compared to conventional PE materials with a Hydrostatic Design Basis (HDB) rating of 2500 psi. The HDB rating for PA11 was established after long and exhaustive testing performed at various temperatures (73°F, 140°F, and 176°F) subject to PPI TR-3 and ASTM D 2837 specifications. Additionally, third party testing and evaluations of the PA11 material by GTI (formerly the Gas Research Institute) corroborates the material's strength, long-term integrity, and operational performance.

Questar also proposes that the design factor of 0.32 in the formula in §192.121 be increased to 0.40. The design factor is used to account for nominal variations in material and manufacturing quality, as well as to compensate for other stresses in the pipe which are unrelated to internal pressure. such as earth loading, subsidence, compression fittings, and temperature changes. The design factor of 0.32 was adopted from the United States of America Standards (USAS) code (now American Society of Mechanical Engineers B31.8). The design factor in B31.8 and §192.121 were initially published over 25 years ago and have been unchanged since that time. Currently manufactured plastic pipes, particularly PA11 pipes, which have been approved by the American Society of Testing Materials (ASTM), are manufactured with very little variation in material and manufacturing quality. In addition, stresses in pipes, other than internal pressures, have been found to have a more limited effect than previously thought. A final draft of the petition to increase the design factor to 0.40 is being reviewed by the OPS. Final comments are being addressed by the American Gas Association Plastic Materials Committee (AGA-PMC) that support the increase in the design factor for polyethylene gas piping materials, which have a HDB rating that is 50% less than the PA 11 material.

Most importantly, however, is the continued safe operation of two separate installations of PA 11 piping systems at 150 psig, as outlined in the attached Technical Reference Summary. These installations include one installation in 1999 that is operating at 150 psig in the public right-of-way within the Nicor Gas distribution network under an approved waiver from the Illinois Commerce Commission (ICC Docket No: 98-0494). The public right-of-way installation has validated the ability of PA 11 piping systems to operate safely at pressures up to 150 psig as limited by its long term performance properties. The second installation in 1997 on private property is operating at 150 psig and has not experienced any problems. Characterization of the short-term and long-term mechanical properties have shown no deleterious effects of 150 psig pressure and exposure to in-service conditions.

Proposed Procedural and Safety Measures

In order to safely complete the PA 11 demonstration project, Questar is proposing a number of safety precautions to ensure proper installation, and adequate collection and analysis of the test data. Questar proposes the following:

- 1.) Conduct a technical conference in Salt Lake City with GTI and Division pipeline safety staff to provide adequate background and data on PA11.
- 2.) Consult with Division pipeline safety staff on siting of the PA 11 demonstration project and to finalize an

- acceptable location(s).
- 3.) Pending receipt of the requested waivers, install the project in accordance with procedures developed specifically for PA11 to ensure quality.
 - 4.) Pressure test the newly installed pipe at 150 percent of maximum operating pressure under the requirements set forth in §192.513.
 - 5.) Conform to all other related requirements stated in §§ 192.191, 192.285, and 192.287.
 - 6.) Maintain the following records for pipe installed for the demonstration:
 - material type
 - location
 - length
 - pressure
 - pipe size
 - wall thickness
 - class location
 - 7.) Maintain line markers consistent with Questar's existing procedures.
 - 8.) Conduct a leak survey of the installed PA11 pipe quarterly during the first year and then on an annual basis, for five years, which are beyond the requirements in §192.723. At that time, normal survey intervals will begin, based on §192.723, unless concerns by Division pipeline safety staff give rise to other stipulations.
 - 9.) Remove certain cross-sections of pipe at the end of both a 12-month and 24-month time period, for testing and evaluation of the aging characteristics of the PA11 pipe material. The removed specimens will be submitted to GTI for testing and evaluation.
 - 10.) Provide the results of the GTI testing and evaluation to the Division pipeline safety staff and OPS to assist in updating the pipeline safety regulations based on information gained on PAH pipe.

Through consultation with GTI, Questar is satisfied that the basis for the requested waivers has been studied for several years, and that adequate tests have been conducted to verify that these waivers are consistent with pipeline safety. Questar respectfully requests your review of this matter and assistance in obtaining the needed waivers from §192.121 and §192.123(a).

Your consideration of this matter is appreciated. Questar looks forward to continuing the dialogue on the proposed PA11 demonstration project.

Sincerely,
Ron Jorgensen, P.E.
Director, System Integrity & Environmental Services

- BEFORE THE PUBLIC SERVICE COMMISSION OF UTAH -

In the Matter of the Request of Questar Gas)	<u>DOCKET NO. 02-057-07</u>
Company for Waiver of Federal Pipeline)	
Safety Regulations in Order to Utilize High)	<u>REPORT AND ORDER</u>
Pressure Polyamide 11 Plastic Pipe in a)	
Demonstration Project)	

ISSUED: August 1, 2002

By the Commission:

Questar Gas Company seeks to conduct a demonstration project for a new type of high pressure plastic pipe, known as Polyamide 11 or PA-11. In order to do this, Questar seeks waiver from provisions of portions of the Commission's regulations on pipeline safety for this project.

Questar proposes to install up to fifteen miles of PA-11 pipe within its service territory in Utah for purposes of demonstrating the viability of the new pipe technology as a possible replacement for steel in certain high pressure applications. The PA-11 pipe does not currently meet the requirements of federal pipeline safety regulations for the intended application. The federal regulations are adopted in this Commission's rules. Questar is, therefore, requesting waivers from this Commission and from U.S. Department of Transportation, Office of Pipeline Safety for this project. Specifically Questar requests waiver of Part 192.123(a), to allow operation of the PA-11 pipe at pressures greater than 100 psig, and Part 192.121 to result in an increase in the design factor in the design formula within Part 192.121 from 0.32 to 0.40.

The Division of Public Utilities has investigated the request. As part of its investigation, a technical conference was held with Questar, the Gas Technology Institute, and the Division pipeline safety staff. The Division reports that it has received sufficient information to recommend approval of the waivers with five specific conditions. We concur with the Division's recommendation.

ORDER

NOW, THEREFORE, IT IS HEREBY ORDERED, that:

1. For purposes of this test project only, Questar is granted a waiver from the pressure limits Part 192.123(a) to allow operation of PA-11 pipe at pressures up to 200 psig as calculated with a design factor of 0.40 for the proposed system.
2. For purposes of this test project only, Questar is granted a waiver of Part 192.121 to result in an increase in the design factor in the design formula within Part 101.121 from 0.32 to 0.40.
3. Questar is to provide sufficient notification to the Division of Public Utilities pipeline safety personnel to afford the Division the opportunity to be present during the installation and testing of the PA-11 pipe.
4. The PA-11 pipe must be installed using joining procedures recommended by the manufacturer.
5. The PA-11 pipe must be installed in a Class 1 area for those tests which exceed the design pressure of 160 psig (calculated using the 0.32 design factor).
6. Installation shall be by open trench only. Directional drilling must not be used.
7. A minimum of six (6) inches of screened shading material of 318 inch minus shall be provided below, above, and on the sides of the installed pipe.

8. Pursuant to Utah Code Ann. § 63-46b-13, an aggrieved party may file, within 20 days after the date of this Order, a written request for reconsideration by the Commission. Pursuant to Utah Code Ann. § 54-7-15, failure to file such a request precludes judicial review of the Order. If the Commission fails to issue an order within 20 days after the filing of such a request, the request shall be deemed denied. Judicial review of this Order may be sought pursuant to the Utah Administrative Procedures Act (Utah Code Ann. §§ 63-46b-1 et seq.)

DATED at Salt Lake City, Utah, this 1st day of August 2002.

/s/ Stephen F. Mecham, Chairman

/s/ Constance B. White, Commissioner

/s/ Richard M. Campbell, Commissioner

Attest:

/s/ Julie Orchard
Commission Secretary