

Small Gas Piping Systems In the State of Washington

March 5, 2007

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Second Consultant Report (With Input from Public Workshop)

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EXECUTIVE SUMMARY

The State of Washington Utilities and Transportation Commission (UTC) has requested Oleksa and Associates to perform a study to identify system characteristics that pose risks warranting a regulatory or policy response, to identify the types of small gas systems operating in Washington, and to identify the range of regulatory/policy responses for those systems. This second report, with input resulting from a public workshop held on October 4, 2006, covers master meter and other small gas piping systems that have buried piping, without regard for whether the systems are currently covered by regulations or industry codes, and that either serve more than one building or have piping in locations accessible to the public. This study applies only to natural gas, propane, and landfill gas pipelines. (See Section 2.)

Small gas systems that are currently under UTC jurisdiction are “master meters”, as defined in federal and Washington rules. There are serious problems with the current definition of “master meter”. A piping system is a “master meter” only if gas is resold – this is not an indicator of risk. Many piping systems (e.g., prison complexes, colleges, schools, industrial piping systems) may have high risk situations, yet they may not be “master meters,” and they are not covered by any regulations or industry codes that cover operation and maintenance. A small gas piping system could be reclassified to or from master meter status over and over again simply by making minor changes (such as by installing or removing a water heater or overhead air heater) that would affect whether gas is resold or not. It could be difficult or impossible for UTC inspectors to be aware of all these changes. (See Section 3.)

Risk is the result of the probability of an event happening multiplied by the consequence of that event (see Section 7.1.1).

There is insufficient data available to calculate precise numerical risk for small gas piping systems, but there is enough information to rank relative risks of various piping systems (see Section 7.5). Risk in a small gas piping system is no less than that in a large system, and in fact may be greater on a per foot basis (see Section 7.1.2).

Similarly, risk in non-jurisdictional piping cannot be expected to be less than that in large jurisdictional piping systems. An additional factor that affects non-jurisdictional piping is that there is neither any regulatory oversight nor any industry code to provide operations and maintenance guidance to an operator of such a system. The result is that, while deficiencies in jurisdictional systems are being identified through inspections and remedied (decreasing overall risk with time), deficiencies in non-jurisdictional piping may be overlooked. Overlooked deficiencies will deteriorate over time, and may create hazards (increasing overall risk with time). As these two contrasting trends continue, non-jurisdictional piping, overall, will likely become the highest risk. (See Sections 7.1.3 and 7.1.4.) The National Transportation Safety Board (NTSB) indicates that lack of adequate oversight can be a contributing factor to very serious accidents (see Section 7.1.4 (b)).

Propane piping systems can generally follow the same rules as those for natural gas pipeline systems, with some exceptions to address the fact that propane is heavier than air and has a much lower LEL (lower explosive level). Additional rules covering leak detection techniques and venting are appropriate. (See Sections 7.1.5 and 9.3, and Appendix D, Section 8.)

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There are three risks applicable to small gas piping systems: risk due to leaks, risk due to overpressure, and risk due to asphyxiation (see Section 7.2). There are eight causes of leaks identified on the federal annual report form (see Section 7.3). Using the three identified risks and the eight causes of leaks, 21 areas of concern have been identified (see Section 7.4 and Appendix C). Based on experience, 8 areas of concern have been identified as high risk (see Section 7.5.2). A piping system is considered very high risk if it is both non-jurisdictional and contains a high risk area of concern. This information is shown in table form in Appendix C.

There is insufficient information available at this time to identify how many or where all the small gas systems in Washington are. Many (likely most) of the privately-owned master meter systems have been identified, and many other systems have been identified. Additional input might be available from propane distributors and from government agencies such as fire departments. The UTC should begin with information that is available and recognize that the data base of small gas piping systems will continue to grow as information becomes available. (See Section 8.)

A range of four regulatory/policy responses is provided (see Section 9.4):

- (1) Continue with the status quo,
- (2) Establish separate regulations specifically for small gas piping systems,
- (3) Establish an on-going education program, and
- (4) Encourage LDCs to take over small gas piping systems.

These responses may be used individually or in combinations.

Since federal pipeline safety rules already apply to all master meter systems, Washington cannot promulgate separate rules for small gas pipelines that are master meters unless a waiver is obtained from the federal Pipeline and Hazardous Materials Safety Administration (PHMSA) (see Section 9.6).

RECOMMENDATIONS

Based on the information presented in this report, Oleksa and Associates makes the following recommendations.

- (1) Work with propane distributors to obtain a listing of all small propane piping systems that meet the scope of this study (see Section 8(b)).
- (2) Work with city, county, or other governmental units to identify publicly-owned small gas piping systems (see Section 8(c)).
- (3) Work with the Washington Fire Marshal and local fire chiefs to identify all commercial and industrial small gas piping systems. Fire officials can identify locations that operate underground gas piping systems as they perform their normal inspections. (see Section 8(d)).
- (4) Work with the Washington legislature to obtain authority to inspect and enforce pipeline safety rules on publicly-owned gas piping systems (see Section 9.2).

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- (5) Work with the Washington legislature to obtain authority to inspect and enforce pipeline safety rules on all small gas piping systems covered in this report, including those that do not meet the definition of “master meter” .
- (6) Ensure that the UTC has regulatory and enforcement oversight for all propane small gas piping systems (see Sections 7.1.4(b) and Appendix D, Section 8).
- (7) Promulgate pipeline safety rules for small gas piping systems. See Section 9.4.2 and Appendix D for material that should be included in the rules. Because of the small and simple nature of most small gas piping systems, these rules should be much simpler and more straight-forward than the full regulations found in 49 CFR Part 192. At the present time, these new rules cannot be applied to gas piping systems that meet the definition of “master meter”. Furthermore, the UTC may not have the authority to apply any safety rules to small gas pipeline systems that are not master meter systems.
- (8) Include in item (7) above a requirement for operators of small gas piping systems to prepare an annual report. This could be done electronically. UTC could then begin to track information over the years to identify trends and potential problems so that further modifications can be made to its pipeline safety program to increase public safety (see Appendix D, Section 10).
- (9) Petition the Pipeline and Hazardous Materials Safety Administration (PHMSA) for a waiver to apply the new Washington rules to master meters (see Section 9.6). Such a waiver is justified if it streamlines the applicable rules and eliminates material that is not applicable, making it more likely that small pipeline system operators do what is necessary to improve the level of public safety.
- (10) Establish an on-going education program for appropriate small gas pipeline operators, particularly industrial system operators (see Section 9.4.3). Operators participating in the on-going education program would not be subject to routine pipeline safety inspections, but should be inspected in the event of an incident or other unusual circumstance. The operators should be required to submit an annual report (see item (8) above).
- (11) Encourage local distribution companies (LDCs) to take over small gas piping systems (see Section 9.4.4). Provision must be made to reimburse the LDCs for the cost of bringing the small gas piping systems up to their own standards.
- (12) The pipeline safety rules for small gas piping systems (item (7) above) should include a simplification of the Operator Qualification rules in 49 CFR Part 192, Subpart N (see Appendix D, Section 7). Standardized “covered tasks” may be appropriate. Qualification of personnel qualified by other entities should be accepted, but provision must be made such that the original qualifying entity would not assume any liability if its qualification were to be used by an operator of a small gas piping system.
- (13) A federal notice of proposed rulemaking (NPRM) for pipeline safety rules for distribution Integrity Management Plans (DIMP) is expected in the near future (see Section 9.5). While these rules may be appropriate for large gas

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pipng systems, they would be counterproductive to the simplified rules that are recommended for small gas piping system operators (see Section 9.4.2 and Appendix D). It is recommended that UTC provide comment to PHMSA to this effect.

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1. BACKGROUND

The pipeline safety program of the Washington Utilities and Transportation Commission (UTC) is seeking information about the risks of small gas pipeline systems and possible safety measures that could be taken to mitigate those risks. The program has contracted with Paul E. Oleksa of the pipeline safety firm Oleksa and Associates to conduct the study.

1.1 Purpose of the Study

The following is taken from the UTC web site.

The UTC is the state agency with the responsibility for enforcing federal and state safety laws on intrastate gas pipeline systems. Currently, the commission's intrastate pipeline safety program is involved with inspecting the state's seven local natural gas distribution systems and the seven gas pipelines owned by large industrial gas customers. The commission also inspects roughly 16 small gas pipeline systems which meet the federal definition of "master meter" systems. However, in recent years, the UTC pipeline safety program has found that not all small gas pipeline systems which could potentially pose a public safety risk fit into the federal definition of master meter systems. Furthermore, some that do fit into the definition may not pose a risk sufficient to require the current level of regulation.

The purpose of the study is stated on the UTC web site as follows.

The purpose of the study is to:

- 1. Identify system characteristics that pose risks warranting a regulatory or policy response.*
- 2. Identify the number and types of small gas systems operating in Washington.*
- 3. Identify the range of regulatory/policy responses to these systems.*
- 4. Develop recommendations for regulations and possible legislation comprehensively addressing small gas systems.*

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The following table addresses where each purpose is addressed in this report.

Purpose of Small Gas Piping Study and Where Addressed	
Purpose of the study as stated on the UTC web site	Where addressed in this study
<p>1 <i>Identify system characteristics that pose risks warranting a regulatory or policy response.</i></p>	<p>Section 2, Scope of the Report</p> <p>Section 3, Master Meter Systems</p> <p>Section 4, Types of Small Gas Piping Systems</p> <p>Section 7, Risk</p>
<p>2 <i>Identify the number and types of small gas systems operating in Washington.</i></p>	<p>Section 8, Identification of Small Gas Piping Systems.</p> <p>Appendix B, Types of Small Gas Piping Systems in Washington</p>
<p>3 <i>Identify the range of regulatory/policy responses to these systems.</i></p>	<p>Section 9, Range of Regulatory / Policy Responses.</p> <p>Appendix D, Summary of Proposed Rules</p>
<p>4 <i>Develop recommendations for regulations and possible legislation comprehensively addressing small gas systems.</i></p>	<p>Section 9, Range of Regulatory / Policy Responses.</p> <p>Executive Summary and Recommendations</p>

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1.2 Required Tasks

The UTC web site identifies required tasks to be performed by the study contractor. The following table presents these required tasks and indicates where each item is addressed.

Required Tasks and Where Addressed		
	Required Tasks as stated on the UTC web site	Where addressed
1	<i>Review of records, state and national studies, other publications, as well as available history and data, and comments from the industry and the public.</i>	Section 5, Meetings and Site Inspections Section 6, Literature Review
2	<i>Assist UTC staff in preparing materials for and participate in public workshops/discussions regarding small gas systems.</i>	See more on the Public Workshop conducted at the UTC office on October 4, 2006 on the UTC website at www.wutc.wa.gov/pipeline .
3	<i>Identify the characteristics and relative risk of small gas systems. Obtain feedback from stakeholders on conclusions.</i>	Section 2, Scope of the Report Section 3, Master Meter Systems Section 4, Types of Small Gas Piping Systems Section 5, Meetings and Site Inspections Section 7, Risk
4	<i>Assist UTC staff in developing range of regulatory and policy options.</i>	Section 9, Range of Regulatory / Policy Responses. Appendix D, Summary of Proposed Rules
5	<i>Prepare a written report of study findings, including a ranking of the relative risk of small gas system configurations and an outline of policy options.</i>	This report, in total. Section 7, Risk Section 9, Range of Regulatory / Policy Responses Appendix C, Ranking of Relative Risk – Summary Appendix D, Summary of Proposed Rules

2. SCOPE OF THE REPORT

It may appear at first that the scope of the report would be obvious, but lengthy discussions with potential stakeholders indicated that this was not the case. Furthermore, it became evident that establishing the scope would significantly affect the results of the report and ultimately the study. Establishing the scope, therefore, is a critical step in conducting the study.

This report is limited to piping systems that include the following.

Natural gas, propane, or landfill gas;

Below ground piping; and

One or both of the following.

- (1) Gas supply to more than one building, or
- (2) Piping that is located on property open to public access.

This report includes all such piping systems without regard to whether a particular piping system is covered by any publicly-available standards, or whether it is covered by any governmental rules or regulations.

This report does not include agricultural piping or on-site landfill gas piping.

The analyses that led to this conclusion are presented below in this Section and were discussed at the stakeholder public workshop held on October 4, 2006.

2.1 Type of Gas

The scope of this study did not include industrial gases or gases other than natural gas, propane, or landfill gas.

2.2 Above-Ground Piping

Piping systems consisting entirely of above-ground piping were not included within the study for the following reasons.

- (a) Above-ground piping inherently has less risk than below-ground piping. This is true because of the following reasons.
 - (1) Above-ground piping generally does not fail from electrolytic corrosion. Cathodic protection is not required.
 - (2) Above-ground piping is clearly visible. It is therefore less likely to be accidentally damaged by construction activities.
 - (3) Gas leaking from an above-ground pipe is not as likely to migrate to a remote location.
- (b) Above-ground piping, other than master meter systems, exists in most of the buildings within the state. Thus there are a huge number of such piping systems.

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- (c) To include above-ground piping in this study would result in drawing time and resources away from other piping systems with higher risk.

Therefore, since the underground piping systems have higher risk of leak or failure, it is reasonable to focus on those piping systems at this time.

2.3 Existence of Rules, Regulations, or Standards

Individuals associated with piping systems tend to think about such systems with respect to which set of rules, regulations, or standards apply to the particular piping system. To meet the purpose “*Identify system characteristics that pose risks ...*”, it was decided that the initial part of the study would be performed without regard to which rules, regulations, or standards apply to a given piping system. Piping systems would be studied simply in terms of risk.

After all underground piping systems have been identified, then the applicable rules, regulations, or standards could be reviewed to determine whether “... *a regulatory or policy response ...*” is warranted.

2.4 Number of Buildings Served

There may be small gas piping systems supplying gas to only one building. For example, if a customer meter for a natural gas utility is located near the street, the gas typically is piped underground to the customer building. This piping is known as a “customer buried piping”, or “yard line.”

It was decided to limit the study to piping systems supplying gas to more than one building for the following reasons.

- (a) The risk of leaks or failures of many of these piping systems (e.g., “customer buried piping”, or “yard line”) is low because the systems are covered by federal pipeline safety standards (49 CFR Part 192, §192.16). Generally, the pipeline operator is required either to maintain the customer buried piping, or to notify the customer that it is the customer’s responsibility.
- (b) There are relatively few of these piping systems.
- (c) They are difficult to locate.

2.5 Public Access

Because of the exposure to the public, piping systems that are located on property other than that owned by the operator or which allow public access are included within the scope of the study, regardless of the number of buildings served.

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2.1 Exceptions

The following piping systems are excepted from this study. The risk related to this piping is minimal compared to other piping systems. The piping is generally remote from population centers, is generally not under pavement, and leaks, if they occur, are likely to vent harmlessly to the atmosphere.

- (a) Agricultural piping (e.g., a gas pipe running to a barn), and
- (b) Landfill gas piping systems up to the point where they may become jurisdictional to the regulations in 49 CFR Part 192, "Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards." Generally, landfill gas piping systems become jurisdictional when they transport gas off site.

3. MASTER METER SYSTEMS

3.1 Definition

Master meter systems are defined in the federal pipeline safety standards (49 CFR Part 191, §191.3) as follows.

Master Meter System means a pipeline system for distributing gas within, but not limited to, a definable area, such as a mobile home park, housing project, or apartment complex, where the operator purchases metered gas from an outside source for resale through a gas distribution pipeline system. The gas distribution pipeline system supplies the ultimate consumer who either purchases the gas directly through a meter or by other means, such as by rents.

Washington Administrative Code also reference this definition in defining master meters (WAC 480-93-005 (16)).

3.2 Problems with the Definition

3.2.1 Resale of Gas

Note that the federal definition of master meter requires that the gas be resold. Whether or not gas is resold may not be easily ascertainable.

Consider the examples in Appendix A. From these examples, it is clear that in many cases, whether a piping system is classified as a master meter depends on financial or accounting arrangements, not on pipeline safety issues. Inspectors are expert in pipeline safety matters, not financial or accounting arrangements. It may be difficult for inspectors in the field to have access to sufficient information to make accurate determinations. Additionally, the financial or accounting arrangements that an operator makes may change from year to year.

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3.2.2 No Consideration of Risk

The federal definition of master meter contains no consideration of risk. Whether gas is resold or not is not an indicator or risk.

Some piping systems exist that have similar physical characteristics as many master meter systems, and would have similar risk, but do not fall under the master meter definition because they do not resell the gas. Some examples of these systems may include prison complexes, college campuses, and industrial piping systems.

Other piping systems may fall under the master meter definition, but exhibit significantly less risk than the non-master meter systems described in the above paragraph. An example of this is piping in some high-rise apartment buildings. (See paragraph 3.2.5 below.)

See Appendix A and Appendix B for more detailed examples of how risk is not treated uniformly in the definition of “master meter”.

3.2.3 Many Piping Systems Not Included in Definition

- (a) Using the examples and logic presented in Appendix A, it can be seen that many small piping systems are not included in the definition of “master meter.” Types of small gas systems are presented in Appendix B. The following types of small gas piping systems may not fall under the definition of “master meter”:
 - (1) Prison complexes
 - (2) Hospital complexes
 - (3) Nursing home complexes
 - (4) Elementary and secondary school complexes (campuses)
 - (5) College and university campuses
 - (6) Greenhouse complexes
 - (7) Industrial companies with multiple buildings
- (b) These piping systems, however, may have some or all of the following characteristics.
 - (1) The piping systems may be extensive,
 - (2) the piping may be under pavement or hard-packed surfaces causing leaking gas to migrate,
 - (3) leaks could affect large numbers of people.
 - (4) Potential leaks could affect people who are confined, are of impaired mobility, or would be difficult to evacuate.

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3.2.4 Classification can Change from Year to Year

The classification of a piping system can change from year to year as a result of actions that UTC would not be aware of, and that UTC would have no control over. Examples of such changes are as follows.

- (a) A change in financial or accounting arrangements (e.g., a university arranges for a commercial restaurant to occupy part of a student union building, or a university with a commercial restaurant on campus decides to perform the food service function in-house); or
- (b) The addition or removal of a single gas appliance (e.g., a factory sublets part of its facility to another company, and the lessee installs or removes an overhead gas heater).

These changes can take place without the knowledge of the UTC, and the time spent pursuing these details takes away from field inspection time.

3.2.5 Piping Systems Included in Master Meter Definition But Not in UTC Study

Some small gas piping systems meet the definition of “master meter”, but are not included in the UTC small gas piping study. An example of this is a system that consists entirely of piping that is not buried (e.g., piping in some high-rise apartment buildings). This type of piping system generally has a lower level of risk than piping that is buried and is generally constructed in accordance with the International Fuel Gas Code. Two big risk factors with buried pipe are corrosion and being damaged by other construction. Piping in buildings generally experiences much less corrosion damage than buried piping. It is less subject to being damaged by other construction because it is generally visible and because mechanized excavation equipment is not likely to be used nearby. The exclusion of above-ground master meter systems was discussed and agreed to at the October stakeholder workshop.

3.2.6 Publicly-Owned Master Meter Systems

It is possible that a publicly-owned gas piping system could be a master meter (e.g., a fairground or public housing). At the present time, UTC has no authority to enforce regulations on publicly-owned piping systems. See Section 9.2 below.

4. TYPES OF SMALL GAS PIPING SYSTEMS

For types of small gas piping systems in Washington, see Appendix B.

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5. MEETINGS AND SITE INSPECTIONS

- (a) Several site inspections were performed at a variety of locations throughout the state. These inspections were performed during the following time periods.
 - (1) April 24 – 25, 2006, Olympia and Seattle areas.
 - (2) June 13 – 15, 2006, Spokane area.
 - (3) July 10 – 12, 2006, western Washington.

- (b) Meetings were held with the following.
 - (1) Washington UTC Pipeline Safety program.
 - (2) Gas utility companies.
 - (3) Northwest Industrial Gas Users.
 - (4) Northwest Propane Gas Association.
 - (5) Public Workshop held on October 4, 2006

- (c) Piping systems in the following types of facilities were inspected.
 - (1) Prisons.
 - (2) Fairgrounds.
 - (3) Airports.
 - (4) Public schools.
 - (5) Private schools.
 - (6) Colleges.
 - (7) Housing complexes.
 - (8) Mobile home parks.
 - (9) Greenhouse complexes.
 - (10) Hospital and medical complexes.
 - (11) Industrial facilities.

6. LITERATURE REVIEW

The following material was reviewed.

- (a) “An Analysis of Natural Gas Master Meter Systems (Definition & Program) from a Federal Perspective”, prepared by the Systems & Applied Sciences Corporation for the U.S. Department of Transportation, June, 1979.
- (b) “Assessment of the Need for an Improved Inspection Program for Master Meter Systems”, a report of the Secretary of Transportation to the Congress, prepared by the Volpe National Transportation Systems Center (Volpe Center), January 2002.
- (c) “Integrity Management for Gas Distribution”, Report of Phase 1 Investigations, prepared by joint work / study groups including representatives of: Stakeholder public, Gas distribution pipeline industry, state pipeline safety representatives, and Pipeline and Hazardous Materials Safety Administration, December 2005.
- (d) 49 CFR Part 192 – Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards.

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- (e) State Washington Administrative Code Chapter 480-90
- (f) International Code Council and American Gas Association “International Fuel Gas Code.”
- (g) Gas Piping Technology Committee Guide for Gas Transmission and Distribution Piping Systems, Appendix G-192-11A “Gas Leakage Control Guidelines for Petroleum Gas Systems”. ANSI Z380.1.
- (h) National Transportation Safety Board Pipeline Accident Report “San Juan Gas Company, Inc. / Enron Corp. Propane Gas Explosion in San Juan, Puerto Rico, on November 21, 1996”. NTSB / PAR-97 / 01.
- (i) “The Study and Application of Safety Assessment System for Town Gas Networks”. A paper presented by Yu Jian, P.R. China, to the 23rd World Gas Conference, Amsterdam, 2006.
- (j) Comments from the public regarding the small gas pipeline study.
- (l) Washington pipeline safety program website (www.wutc.wa.gov/pipeline).
- (k) Washington master meter system inspection report.
- (l) Tennessee pipeline safety master meter inspection report.
- (m) Arizona master meter regulations and pipeline safety inspection report.

7. **RISK**

7.1 **General**

7.1.1 **The Concept of Risk**

Risk is the result of the probability of an event happening multiplied by the consequence of that event. It may be characterized by the following equation.

$$\text{RISK} = (\text{Probability}) \times (\text{Consequence})$$

There is insufficient data available to make a precise numerical determination of risk related to small gas piping systems. However, there is enough information available to make some very helpful generalizations.

7.1.2 **Risk of Small versus Large Gas Piping Systems**

- (a) *A pipe is a pipe.* The risk level of a small gas piping system, on a per foot basis, cannot be expected to be less than that of a large gas piping system. A piece of pipe in the ground doesn’t “know” whether it belongs to a small piping system or to some other type of system – it simply reacts to the physical and chemical environment that it is in. The 2002 report “Assessment of the Need for an Improved Inspection Program for Master Meter Systems” states the following on page 51.

In the absence of good data, the probability of an accident on a master meter system can be expected to be greater than or equal to the probability of an

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accident on other gas distribution systems. ... the consequences of an accident on a master meter system will be no less than those of an accident on some other gas distribution system. ... Based on the foregoing, it would appear that the risk of an accident on a master meter system will be no less than that of an accident on other gas distribution systems, and, in fact, it may be greater.

- (b) *Operator skill.* Small gas piping systems are often operated and maintained by personnel who have many other responsibilities, and thus may not have the level of expertise for piping systems that can be expected in a large gas utility. An attempt to impose all the requirements of CFR Part 192 on small gas piping systems may well overwhelm many small system operators with the result that little or nothing would be done, and the overall risk level would increase. It would be preferable to have simplified regulations, using a common sense approach, specifically addressed to small gas piping systems. If the simplified regulations are followed, the overall risk level would decrease.

7.1.3 Risk as a Function of Piping Classification

Risk is not related to whether a small gas piping system is considered to be jurisdictional. For example, if a small gas piping system is a master meter system, and if the classification of that master meter system is changed the following year due to a change in financial arrangements with a food service provider, the risk related to the small gas piping system remains the same. Similarly, if a section of pipe is part of a master meter system, and an identical section of pipe is part of a non-master meter industrial complex, the two identical sections of pipe would have the same risk level even though their classification is different.

7.1.4 Risk in Non-jurisdictional Gas Piping Systems

For the purpose of this report, a “non-jurisdictional” piping system is one for which the UTC does not have authority to inspect.

There is insufficient data available to determine a precise risk level of non-jurisdictional small gas piping systems. However, much can be stated regarding the relative risk of jurisdictional versus non jurisdictional small gas piping systems.

- (a) *A pipe is a pipe.* See Section 7.1.2(a) above. Just as a piece of pipe doesn’t “know” whether it is in a small or a large piping system, it also doesn’t “know” whether it is in a jurisdictional or a non-jurisdictional piping system.

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- (b) *No oversight or guidance for O&M.* The UTC has no jurisdiction over non-jurisdictional piping systems (see Appendix B for some types of small gas piping systems in Washington that are not jurisdictional). No inspections will be made on these systems by UTC or by any other agency.

Non-jurisdictional piping systems are usually designed and constructed in accordance with the International Fuel Gas Code. The International Fuel Gas Code, however, does not contain requirements for operating and maintenance (e.g., leak detection, corrosion control checks, valve inspection, damage prevention, emergency plans, public awareness, and documentation). There are no other industry standards that cover operations and maintenance, either, and there are no state or federal regulations.

There is, therefore, neither any governmental oversight nor any industry guidance to assist operators in the operation and maintenance activities of these pipeline systems.

The National Transportation Safety Board (NTSB) appears to support the concept that oversight of piping systems is critical. In its Pipeline Accident Report "San Juan Gas Company, Inc. / Enron Corp. Propane Gas Explosion in San Juan, Puerto Rico, on November 21, 1996" (in which 33 people died and 69 people were injured), it states that contributing to the explosion was failure of the federal government, the state Public Service Commission, and the parent company to oversee adequately the operation of the gas company.

- (c) *Continual increase in risk.* Operations and maintenance for various piping systems is likely to range from good in some cases to poor in other cases. Factors that can influence operation and maintenance may include awareness of pipeline safety issues, organizational philosophy, mergers and acquisitions, and the experience level of personnel. The lack of industry guidance or regulatory oversight creates a "black hole" that may serve as a "magnet" to attract problems that otherwise would have been prevented by proper operations and maintenance procedures. Without proper on-going operations and maintenance, the overall reliability of these systems is likely to degenerate with time. The probability of an incident, and thus risk, will increase as the systems age.
- (d) *Contrast to jurisdictional piping systems.* In contrast, jurisdictional piping will be inspected by the UTC if they haven't already been inspected. Most piping systems that meet the federal definition of "master meter" are jurisdictional to the UTC (see Appendix A for several examples). Problem areas will be, or have been, identified and mitigated. Thus the overall risk level of these piping systems will decrease over time, regardless of the type of piping systems that exist or the conditions of the piping system.

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- (e) *Relative risk.* There appear to be two trends regarding overall risk due to the probability of an incident.
 - (1) The overall risk of jurisdictional gas piping systems will decrease over time as problem areas will be, or have been, identified and mitigated, and
 - (2) The overall risk of non-jurisdictional gas piping systems will increase due to lack of proper operations and maintenance in some systems.

As these trends continue over time, non-jurisdictional gas piping systems are likely to become the highest risk small gas piping systems in the state

- (f) *Availability of data.* It was pointed out in the October 2006 Workshop that there is no accident data available for non-jurisdictional small gas piping systems that support this conclusion. There is no accident data available to disprove the conclusion either. Unfortunately, there has been no mechanism in place to collect such data. There is a need, therefore, to establish such a mechanism.
- (g) *Need for attention.* It is not in the interest of public safety to ignore a segment that is in need of attention simply because records have not been kept over the years. The best information available (see Section 7.1.2) is that the risk level of a small gas piping system cannot be expected to be less than that of a large gas piping system. It is also logical that if guidance or oversight of some sort is not provided, the overall risk level will increase over time.

7.1.5 Risk in Propane Piping Systems

For most respects, pipeline safety in a propane piping system should be treated the same as pipeline safety in a natural gas piping system. However, there are two significant differences between natural gas and propane. First, propane is heavier than air and natural gas is lighter than air. Gas from a leak in a natural gas pipeline tends to rise and vent to the atmosphere, where it dissipates and becomes harmless. Propane gas tends to settle and “puddle” in low spots, where it can remain for a long period of time. Secondly, propane can ignite at a much smaller concentration in air than natural gas can. If a source of ignition contacts the “puddle”, an explosion may occur. If a person enters a space containing propane gas, asphyxiation may occur. For suggested regulatory / policy responses to address these additional factors, see Section 9.3 below.

7.2 Specific Risk Concerns

Note: While reading Sections 7.2 through 7.5, it may be helpful to refer to Appendix C, “Ranking of Relative Risk – Summary”.

The specific small gas piping systems described in this study operate at such small stress levels that a pipeline rupture is extremely unlikely. Because a pipeline

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rupture is extremely unlikely, there are only three types of threats that these pipelines are generally subject to.

(a) Risk due to a leak

A leak is, by far, the most common risk occurrence that a small gas piping system is generally subjected to. The consequence of a leak ranges from minimal (in the case of a leak that harmlessly vents to atmosphere) to severe (causing extensive property damage, injury, or even a fatality).

(b) Risk due to overpressure.

Overpressure can cause flames in appliances that do not have regulators and in some burners to burn much higher than normal, igniting near-by materials and causing fires. In some instances, explosions can occur.

(1) Overpressure resulting from a failure in the gas supplier's piping system is not within the scope of this report. Such an occurrence is extremely rare due to the safety precautions incorporated within those piping systems. This report focuses only on the small gas piping systems.

(2) A small gas piping system may have high pressure gas (pressure higher than ounces) and then reduce that pressure through pressure limiting equipment (e.g., a pressure regulator) to low pressure (ounces of pressure). If such a pressure regulator fails or malfunctions, overpressure could result. Therefore, risk due to overpressure only exists if the piping system includes such equipment. Many (perhaps most) small gas piping systems do not contain pressure limiting equipment. Therefore, since there is no such equipment to fail or malfunction, risk of overpressure does not exist in these systems.

(3) Risk due to overpressure is generally a concern only on the portion of piping systems operating at low pressure (less than 1 psig). This is because the consequence (and the resulting risk) of overpressure on piping systems operating at higher pressures is generally minimal due to the protective effect of additional downstream regulators. Piping systems operating at ounces of pressure (less than 1 psig) may supply appliances that do not have appliance regulators or that have appliance regulators that are not capable of withstanding higher pressures. In these instances, an overpressure could result in exceedingly large pilot light flames or burner unit flames. These flames, much larger than normal, could ignite nearby flammable material. Overpressure can also result in leaks.

(4) Because of these limitations, the probability of overpressure occurring is small. The consequence, however, ranges from minimal to severe.

(c) Risk due to asphyxiation.

(1) This risk occurrence would most likely occur in a deep vault or pit or in an excavation.

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- (2) Asphyxiation can occur as the result of a leak in the gas piping system, or it can occur as the result of another (foreign) gas that migrates into the pit, vault, or excavation. The probability of this risk occurrence is low, but the consequence is often severe, and may be fatal.
- (3) Fortunately, most small gas piping systems do not contain deep pits or vaults.

For a discussion of how the probabilities or consequences of these risks can be mitigated, see Section 7.4 below, "Areas of Concern for Small Gas Piping Systems".

7.3 Causes of Leaks (Threats) (From Annual Report Form)

The Annual Report required by the 49 CFR Part 191, §191.11, requires operators to identify the number of leaks eliminated / repaired during the previous year according to the following eight causes.

- (a) Corrosion.
- (b) Natural Forces.
- (c) Excavation.
- (d) Other outside force damage.
- (e) Material or welds.
- (f) Equipment (failure).
- (g) Operations (error).
- (h) Other.

These causes of leaks may be considered to be threats to the piping system. Note that they are intended to address only the risk of leaks, not the risk of overpressure or the risk of asphyxiation. However, excavation, equipment failure, or operations error can cause overpressure or asphyxiation.

7.4 Areas of Concern for Small Gas Piping Systems

Risks due to the three factors identified in Section 7.2 and the eight causes of leaks (threats) identified in Section 7.3, allow us to identify the concerns one should have regarding a small gas piping system. In other words, if an independent review is made of a small gas piping system, what are the items that the reviewer should look at or consider in order to help ensure that the piping system is not likely to experience problems resulting from the identified risks or the identified threats?

There are certain items that are important to look at because those items could affect the prevention of a risk event from happening. An example of this is whether periodic leak detection has been performed. Other items are important because they could affect the response if a risk event does occur. An example of an item that could affect response to a risk event is whether or not valves have been properly inspected. If a valve can not be located, or if a valve does not

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function properly when needed, the response to a risk event will be negatively affected.

Based on experience with many gas piping systems, 21 items have been identified. These items are found in the table in Appendix C, arranged first by prevention and then by response. Review of these 21 items, as applied to a given small gas piping system, will give a good indication of the relative risk level of that particular system.

7.5 **Ranking of Relative Risk**

Insufficient data is available to determine precise numerical risk values for various categories of piping systems. Nevertheless, there is sufficient information to make a relative risk ranking of piping systems.

Gas pipeline systems, in general, have very low risk of failure. Nevertheless, no piping system (or any other humanly-made system) has zero risk. Since data is not available to calculate numerical risk values, judgment has been used to assign a value of "high" to certain items, whereas the remaining items have been assigned a value of "normal". Where two "high" values apply to the same item, a value of "very high" has been assigned.

7.5.1 **Non-jurisdictional piping**

Based on the risk information in Section 7.1.4 above, the risk level for any area of concern is higher for non-jurisdictional piping than it is for jurisdictional piping. This is shown visually in Appendix C.

7.5.2 **High Risk Areas of Concern**

All of the areas of concern (see Section 7.4 above, and Appendix C), are important. However, experience has shown that certain items are more significant than others. These are as follows (the following items are listed in the same sequence that they appear in Appendix C).

- (a) *Use of non-approved plastic pipe.* Plastic pipe designed for gas service has the ASTM Designation: D2513 "Standard Specification for Thermoplastic Gas Pressure Pipe, Tubing, and Fittings" or D2517 "Standard Specification for Reinforced Epoxy Resin Gas Pressure Pipe and Fittings".

Only piping manufactured to the appropriate ASTM specifications should be used for gas service. Any other type of piping would present a high risk. It should be remembered that plastic gas piping is installed outside, underground. It is subject to large temperature variations and external forces common to outdoor locations. Plastic pipe has the tendency to expand and contract more than 10 times the amount experienced by steel pipe. This can put great stress on the pipe and its joint connections.

- (b) *Use of non-cathodically protected steel pipe.* Steel pipe corrodes over time. Underground steel pipe is especially subject to corrosion. An

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underground gas leak has a higher risk (due to a possible higher consequence) than an above-ground gas leak because the gas might migrate to a building or enclosure where it could result in an explosion.

Cathodic protection has been developed to prevent or mitigate corrosion on buried steel pipe. Underground steel pipelines that are not cathodically protected, however, have a high risk (due to high probability) of corrosion.

- (c) *Improper joining procedures and improperly qualified joiners.* Plastic pipe is relatively easy to install and to join. However, the joints must be made correctly.
- (d) *Periodic leak detection not being performed.* If there is no periodic leak detection, a leak can grow to the point where it becomes hazardous. Gas piping systems are physical objects, and problems or deteriorations can occur over time. Most leaks begin very small and grow over time. Experience has proved that periodic leak detection can detect leaks before they become hazardous.
- (e) *Corrosion control checks not being performed on below-ground pipe.* Steel pipe will corrode over time unless preventive measures are taken (see item (b) above). Cathodic protection must be checked at periodic intervals, and remedial action must be taken when appropriate. If this on-going maintenance is not performed, corrosion will lead to leaks, and the risk is high.
- (f) *Presence of deep vaults and pits.* Deep pits and vaults are those in which a person's head must be below ground level when the person is working on the facilities within the vault. Often entry is by means of a man-hole or similar device. The highest danger of deep pits or vaults is not related to the facilities themselves, but to the fact that a person must enter a confined space in order to operate or maintain the facilities. The dangers of confined spaces have been identified by the Occupational Health and Safety Administration (OSHA), and OSHA has promulgated a set of regulations specifically for entering and working in confined spaces.

However, in an emergency, personnel may be tempted to enter the confined space without proper safety precautions. The risk of fatality due to asphyxiation is high. If other personnel enter the deep pit or vault to attempt a rescue, the risk of multiple fatalities is high.
- (g) *Location such that affected personnel have limited means of escape.* In many gas piping emergencies, there is time for affected personnel to evacuate the danger area. However, a gas piping system that serves a facility such as a hospital, nursing home, or prison is a high risk simply because personnel cannot easily escape a danger area.
- (h) *Location such that a large population could be affected.* Gas piping traverses a wide range of locations, from those that are extremely remote to those that are extremely congested. Gas piping in an extremely congested location presents a high risk because of potential consequence of an incident.

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7.5.3 High Risk Areas of Concern Combined with Non-jurisdictional Piping

The risk level for non-jurisdictional piping is high (see Section 7.5.1 above). The risk level for certain areas of concern is high (see Section 7.5.2 above). Where a piping system meets both of these criteria, the risk level is very high.

7.5.4 Summary of Relative Risk

From Section 7.1, it can be seen that risk is a function of the probability of an incident and the consequence of an incident. Section 7.2 identifies three risks that small gas piping systems are subject to. Section 7.3 identifies eight causes of leaks (threats) that may be used in discussions about risk. Section 7.4 incorporates the risks identified in Section 7.2 and the threats identified in Section 7.3, and identifies 21 areas of concern that are specific to small gas piping systems.

Note that in some instances the reason for the risk originates with the probability of a problem occurring, whereas in other instances the reason for risk originates with the consequences of a problem should it occur. Where high risk areas of concern combine with non-jurisdictional piping, the resultant risk level is very high.

This information is presented in table form in Appendix C. The table in Appendix C also identifies which areas of concern affect the prevention of risk events and which areas of concern affect response to risk events.

8. IDENTIFICATION OF SMALL GAS PIPING SYSTEMS

A major difficulty with reducing the risk level of small gas piping systems is that there is no good way at the present time to identify where these systems are or who operates them. The problem of identification has been discussed for years, but there has been no good solution so far. Many states have requested gas utilities to help identify master meter systems. Much good work has been done, but this effort has generally included only small gas piping systems that are master meters. Furthermore, gas utilities have expressed concerns that it is difficult for them to know where these systems exist.

With all this in mind, it appears that a reasonable approach might be to begin a program with the best information available at the present time, knowing that it is very possible that many small gas piping systems have not been identified. The list of identified systems would be expanded on a continuing basis as new information is obtained.

Information might be obtained by the following.

- (a) Input from gas utility companies (this has already been done once in Washington but needs to be updated).
- (b) Cooperation and input from propane distributors.

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- (c) Cooperation and input from government entities owning small gas pipeline systems.
- (d) Cooperation from local fire officials who perform inspections of commercial or industrial properties. The fire officials could ask if buried gas piping is present as a part of these inspections.

9. RANGE OF REGULATORY / POLICY RESPONSES

9.1 Applicability of Minimum Federal Pipeline Safety Standards

The regulations in 49 CFR Part 192 – Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards are federal regulations. The entire set of regulations in Part 192 applies to master meter systems, except where master meter systems are specifically excluded or where the regulations specifically apply only to transmission pipelines.

The 49 CFR Part 192 regulations do not apply to many small gas piping systems. Often, the reason that the regulations do not apply to a given small gas piping system has nothing to do with pipeline safety, but is based on financial arrangements regarding the resale of gas. See Section 3.2.2 for more details.

The State of Washington has no authority to change the federal regulations or to change their applicability. However, the state may, if it desires, promulgate rules or regulations that are more stringent than the federal regulations. As experience is gained with small gas pipeline systems in Washington, the Federal Office of Pipeline Safety in the Pipeline and Hazardous Materials Administration (PHMSA) may be able to use the state's experience to modify the Part 192 regulations to better address the pipeline safety issues of small gas pipeline systems throughout the country.

9.2 Publicly-Owned Small Gas Piping Systems

Currently, UTC does not have authority to enforce pipeline safety regulations on publicly-owned piping systems, such as those owned by prisons and schools. This prevents the state agency with the greatest pipeline safety expertise from providing guidance to operators who need that guidance. Current state legislation, if adopted, will extend regulation to public master meters but few public small gas piping systems are master meter systems.

9.3 Propane Piping Systems

Although for the most part, propane piping systems can be treated in the same manner as natural gas piping systems, some additional requirements are appropriate to address the fact that propane is heavier than air whereas natural gas is lighter than air (see Section 7.1.5 above).

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The following considerations are suggested to address the unique risks present in propane piping systems.

- (a) Because leaking propane will tend to migrate in a different manner than leaking natural gas, different leak detection survey techniques may be appropriate.
- (b) Because propane gas will tend to settle and accumulate in low spots, precautions may be appropriate to provide adequate ventilation to prevent the accumulation of propane gas.

See Appendix D, Section 8 for specific recommendations to address these issues.

9.4 **Policy Options**

There are four policy options that may address the areas of concern identified by this report.

- (a) Continue with the current federal regulatory model of enforcing the full 49 CFR Part 192 regulations on all master meter systems as defined by federal and state rule and ignoring non-jurisdictional gas piping systems.
- (b) Establish separate regulations aimed solely at small gas piping systems, and follow up with periodic inspections.
- (c) Establish an ongoing education program coupled with a brief annual report.
- (d) Encourage local distribution companies (LDCs) to take over small natural gas piping systems.

There are advantages and disadvantages with each option. The best approach is most likely to use a combination of all four options, each option applied to a specific target area.

These options are discussed in more detail in the following sections.

9.4.1 **Continue with Current Federal Regulatory Model**

There are serious flaws with this option that would have a significant effect on pipeline safety.

- (a) This option addresses only small gas piping systems defined as “master meters”,
- (b) The significant pipeline safety exposure of non-master meter small gas piping systems would be ignored.
- (c) Some small gas piping systems would be regulated one year, and not in another year due to changes in financial arrangements.
- (d) Operators of master meter piping systems may be overwhelmed by the complexity of the full 49 CFR Part 192 regulations, especially since much of that complexity does not apply to their particular piping system.

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9.4.2 Establish Separate Regulations Applicable to Small Gas Piping Systems

The second option is to establish separate regulations applicable to small gas piping systems, and follow up with periodic inspections.

- (a) At the present time, UTC is obligated to enforce the full existing 49 CFR Part 192 regulations on those small gas piping systems that meet the federal definition of “master meter”. See Section 9.6 below regarding a waiver from this obligation.
- (b) UTC could establish rules for non-master meter small gas piping systems, but these rules could not apply to master meter systems without a federal waiver.
- (c) Regulations need not include all the material in 49 CFR Part 192 but rather only those that cover the areas of concern for small gas piping systems (see Section 7.4 above and Appendix C). Small gas piping systems are often operated and maintained by personnel who have many other responsibilities, and thus may not have the level of expertise for piping systems that can be expected in a large gas utility. An attempt to impose all the requirements of CFR Part 192 on small gas piping systems may well overwhelm many operators with the result that little or nothing would be done, and the overall risk level would increase. It would be preferable to cover only those topics which are of primary concern, and to do that well. Then the overall risk level would decrease.
- (d) With similar reasoning, it can be seen that the regulations on a given topic for small gas piping systems may not need to be as long or complex as those in CFR Part 192. One reason for this is that small gas piping systems are generally relatively simple. Another reason is that the supplying gas utility takes care of many of the details for their customer small gas piping systems. For example, 49 CFR Part 192 §192.625 contains material specifications for gas odorants. This is important for a utility that adds odorant to a gas piping system, but is not necessary for a small gas piping system that purchases gas that is already odorized by the utility. A common sense approach for a small gas piping system is to simply check periodically to ensure that the gas is, in fact, odorized.
- (e) Once regulations are in place, an inspection program should be developed.
 - (i) It may be appropriate to establish different inspection schedules for different types of systems.
 - (ii) Initial inspection activities may include a strong educational component as operators that have not been inspected before become familiar with the new regulations.
- (h) The concept of separate regulations for master meter systems is consistent with one of the findings of the 1979 Report, “An Analysis of Natural Gas Master Meter Systems (Definition & Program) from a Federal Perspective.” The following is from Section 7.3 of that report.

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The data indicated that separate recognition of master meter systems in the gas pipeline safety regulations and, possibly, law may be appropriate. For instance:

- the nature and degree of safety hazard in master meter systems is different than that in large utility gas pipeline facilities,*
- the technical expertise and administrative capacity to ensure a safety program are not available to master meter system operators as they are to the utilities,*
- communication with master meter system owners and operators will be much more difficult than it is with utilities.*

- (f) A search of the international natural gas community revealed very little information relating to small gas piping systems. However, a paper “The Study and Application of Safety Assessment System for Town Gas Networks” by Yu Jian, P.R. China was presented at the 23rd World Gas Conference in Amsterdam in 2006. This paper contrasted town gas piping systems with long distance transmission pipelines, and “... raises that the traditional approach of applying to the safety assessment system for Long Distance Gas Transmission Pipelines does not meet the requirements on the infrastructures of Town Gas Networks ... “. While not specifically addressing regulations or standards, the conclusions appear to be consistent with the concept of addressing small distribution systems differently than large piping systems.
- (g) Legislation should be enacted to provide UTC with authority to enforce pipeline safety regulations on publicly-owned small gas piping systems. Such authority should be applicable whether the small gas piping system is a master meter or not.
- (h) Some operating and maintenance methods may be different for propane versus natural gas piping systems (e.g., leak surveys for natural gas lines are often performed using a flame ionization instrument, whereas it is generally more appropriate to perform a leak detection survey for a propane line using bar holes with a combustible gas indicator), but the regulations regarding operating and maintenance (including leak surveys and survey frequency) should be the same.
- (i) See Section 9.5 below regarding proposed Integrity Management regulations for distribution operators.
- (j) See Appendix D for a summary of regulations that would cover the areas of concern identified in Section 7.4 above and in Appendix C.

9.4.3 Establish an On-Going Education Program

The third option is to establish an ongoing education program designed to reach targeted systems. This may provide a much more efficient method to enhance pipeline safety as compared to an inspection program, particularly for systems that have personnel trained in operation and maintenance of piping systems.

- (a) The education program could include a page on the UTC web site devoted to small gas piping systems.
- (b) The education program could include periodic, perhaps annual, seminars, open to all stakeholders.
- (c) Different topics could be emphasized from year to year, so that over a period of years an overall understanding of gas pipeline safety regulations would be obtained.
- (d) The education program could be coordinated with interested organizations.
 - (i) Industry organizations can help arrange an agenda and speakers.
 - (ii) Various pipeline safety experts can provide panel discussions about experiences with specific topics.
- (e) This effort could be coordinated with local and state fire officials to raise awareness.
 - (i) Fire officials could encourage participation in the educational program as they conduct normal facility inspections.
 - (ii) Fire officials could be given access to gas line location schematics (see Section 8(d) above).
- (f) A representative of the federal Pipeline and Hazardous Materials Administration (PHMSA) or the Transportation Safety Institute (TSI) might be invited on occasion to give a presentation.
- (g) A representative of the quality assurance community (e.g., Six Sigma) might be invited to make a presentation, particularly if the speaker is knowledgeable about pipeline safety issues. One of the large industries or one of the natural gas utilities may have such a person. This could be an opportunity to point out how the themes in pipeline safety and quality assurance complement each other, and in pointing out the economic savings of “doing things right”.
- (h) The UTC could send a periodic direct-mail letter to operators participating in the on-going education process, informing them of the program’s progress and inviting them to the next seminar.
- (i) Operators that are included in the on-going education program may not be subject to routine inspection, however, inspections of the piping systems should be made in the event of an incident or other unusual circumstance.

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- (j) Operators that are included in the on-going education program should submit an annual report, just as other small gas piping system operators (see Appendix D, Section 7). For operators that are currently non-jurisdictional, the annual report information will allow UTC to begin assembling and tracking data that will help in future pipeline safety efforts.
- (k) An on-going educational program may be particularly appropriate for industrial small gas piping systems. These systems are generally operated and maintained by personnel trained in piping and other systems. In general, these systems are unique in that industrial sites generally have trained maintenance personnel, are inspected by fire officials, may be inspected by industrial insurance companies, and often belong to industry organizations that can assist in pipeline safety activities. An on-going educational program can easily fit into and complement their existing programs.

9.4.4 Encourage LDCs to Take Over Small Gas Piping Systems

This option was discussed at the October 2006 Workshop.

One LDC has contracted with some master meter operators to provide operations and maintenance functions on their piping systems.

In general, the LDCs were concerned about assuming additional liability if they took over small gas piping systems. This concern is justified because there is often question about whether the piping was installed to the same standards as the LDC piping, about where the piping is actually located, about what specific type of pipe, joints, and fittings were used during construction, and about what the condition of the piping system is.

Although no commitments were made, LDCs seemed willing to consider taking over small gas piping systems if they could re-construct the piping system to their own standards and be reimbursed for the cost involved.

If an acceptable financial plan could be obtained, this would be a good solution for many of the small gas piping systems. The advantages are that the piping systems would meet the same standards as those applied to the LDCs, and the piping would be inspected by the UTC in the same way that other LDC piping is inspected.

9.5 Integrity Management Plans

The December 2005 report "Integrity Management for Gas Distribution", Attachment B, page 3, Finding 4/5-4, states the following.

Part 192 needs a regulation that specifically requires a distribution integrity management program

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It is expected that the federal Pipeline and Hazardous Materials Safety Administration (PHMSA) will issue a proposed rulemaking for distribution Integrity Management Plans (DIMP) in the near future.

Although a formal, written integrity management program may be appropriate for a large gas utility, such a requirement would not be applicable to small gas piping systems. Rules or regulations for small gas piping systems should be simple, common-sense requirements that are easily understood. Prescriptive rules are best for these systems. An integrity management system would be a great burden for operators of small gas piping systems, and there does not appear to be a need for such an approach. Such rules would be counterproductive to the simplified rules that should be adopted for small gas piping system operators (see Section 9.4.2 and Appendix D).

If federal regulations do require operators of small gas piping systems to have an integrity management plan, consideration should be given to using the model plan currently being developed by the Security and Integrity Foundation (SIF), a part of the American Public Gas Association (APGA).

9.6 State Waiver from Federal Regulations

If the State of Washington adopts rules as summarized in Section 9.4.2 above, it would be appropriate, from a pipeline safety perspective, to apply those rules to master meter systems which are currently subject to the full 49 CFR Part 192 regulations. This action would increase the level of pipeline safety by focusing on the areas of concern that are specifically applicable to master meter systems. It would ease the burden on both the owners and operators of the master meter systems and on the inspectors because it would eliminate a great deal of material that is not applicable. Thus this action would streamline the applicable rules and regulations and increase the level of public safety.

Presently, the State of Washington is obligated to enforce the full 49 CFR Part 192 regulations on all jurisdictional master meter systems. However, there is provision to apply for a waiver. A waiver could be requested to substitute the Washington rules for Part 192 for master meter systems in the State of Washington. If the Pipeline and Hazardous Materials Safety Administration (PHMSA) approves such a waiver, the State of Washington would be free to enforce its own rules on the master meter systems.

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10. APPENDICES

List of Appendices	
Appendix Number	Title
Appendix A	Examples of Master Meter Systems
Appendix B	Types of Small Gas Piping Systems in Washington
Appendix C	Ranking of Relative Risk – Summary
Appendix D	Summary of Proposed Rules

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Appendix A

A key characteristic of a master meter is the existence of resale. Gas must be resold in order for a piping system to be a “master meter” system. An obvious example of resale is where a small gas pipeline system owner bills a tenant for the use of the gas. Below are several examples.

EXAMPLES OF SMALL GAS PIPELINE SYSTEMS			
Item	System Description	Explanation	Master Meter (Y / N) (See paragraph above table)
1	An apartment complex purchases gas from a gas utility, then transports the gas through an underground piping network to several buildings. The gas fuels boilers, which provide heat to the apartment units. There are no gas appliances in the apartment units.	Gas is supplied to the boilers, which are owned by the apartment complex. The apartment owner supplies heat to the apartment unit, but does not supply gas. Therefore there is no resale of gas.	N
2	In the apartment complex in item 1, a gas range is installed in one of the apartment units. There is no gas meter for the apartment unit, and the tenant does not pay a separate gas bill.	Gas is supplied to the tenant. Although the tenant does not pay a separate gas bill, the cost of the gas is included within the rent paid by the tenant.	Y
3	In the apartment complex in item 1, a gas furnace and range is installed in each apartment unit. There is a gas meter for each apartment unit, but the tenants do not pay a separate gas bill.	The gas meters at each apartment unit (sub-meters) are used by the apartment complex for tracking and control purposes. The tenants pay for the gas through their rents.	Y
4	A university purchases gas from a gas utility, then transports the gas through an underground piping network to several buildings. The gas fuels boilers, which provide heat to the buildings.	The gas is used by the university. It is not resold. The students do not purchase gas.	N
5	In the university in item 4, gas is also supplied to chemistry labs where it is used by students in Bunsen burners and in ovens.	Although there may be differences of opinion regarding this, it is believed that the use of gas by a student in a lab does not constitute resale of gas to the student.	N

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APPENDIX A – CONTINUED			
EXAMPLES OF SMALL GAS PIPELINE SYSTEMS			
Item	System Description	Explanation	Master Meter (Y / N) (See paragraph above table)
6	In the university in item 4, gas is also supplied to restaurants operated by outside companies in some of the buildings.	Gas is resold to the restaurants, whether the restaurant pays a separate gas bill, or whether the cost of the gas is included in their rent or other fees.	Y
7	A manufacturing company purchases gas from a utility, then transports the gas through an underground piping network to several buildings. All the buildings are part of the manufacturing company complex. Gas is used for heat, for various appliances, and for the manufacturing process. The company operates a cafeteria in one building for the employees, and the cafeteria uses gas appliances.	All the gas is used by the manufacturing company.	N
8	The company in item 7 leases a portion of one of its buildings to another company. Heat is provided to the lessee company, but the lessee company does not operate any gas appliances.	All the gas equipment and appliances are controlled by the lessor company.	N
9	The lessee company in item 8 installs a gas hot water heater.	Gas for the lessee company's hot water heater is supplied by the lessor company. The piping system operated by the lessor company is now a master meter system.	Y
10	The manufacturing company in item 7 allows a food service company to take over its company cafeteria, which uses gas appliances.	Gas for the food service company is provided by the manufacturing company. The piping system operated by the manufacturing company is now a master meter system.	Y

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Appendix B

Types of Small Gas Piping Systems in Washington

With the scope of the study defined in accordance with Section 2 of the report, the potential types of small gas piping systems are provided in the following table.

TYPES OF SMALL GAS PIPING SYSTEMS IN WASHINGTON							
Item	Description	Master Meter (Y / N)	Federal Regulations Apply (Y / N)	State Rules Apply (Y / N)	Industry Codes Apply to O&M (Y / N)	Comments	
1	Gathering lines outside of jurisdictional locations	N / A	N / A	N / A	N / A	Currently there are no production facilities in Washington.	
2	“Free gas” lines from natural gas production facilities	N / A	N / A	N / A	N / A	Currently there are no production facilities in Washington.	
3	Propane distribution systems	See note (1) at end of table.	See note (1) at end of table.	See note (1) at end of table.	N	Propane distribution systems are generally not “master meters.” See note at end of table.	
4	Publicly-owned master meter systems (See note (2) below)	(a) Colleges and universities	Y	Y	N	N	Colleges and universities might resale gas to food service companies. They may also resale gas to tenants in on-campus apartment units.
		(b) Municipal Housing	Y	Y	N	N	These facilities resell gas to tenants.
		(c) Fairgrounds	Y	Y	N	N	Fairgrounds resell gas to food service vendors.
		(d) Others	Y	Y	N	N	

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APPENDIX B -- CONTINUED							
TYPES OF SMALL GAS PIPING SYSTEMS IN WASHINGTON							
Item	Description	Master Meter (Y / N)	Federal Regulations Apply (Y / N)	State Rules Apply (Y / N)	Industry Codes Apply to O&M (Y / N)	Comments	
5	Privately-owned master meter systems (See note (2) below)	(a) Apartment complexes	Y	Y	Y	N	These facilities resell gas to tenants.
		(b) Mobile home parks	Y	Y	Y	N	These facilities resell gas to tenants.
		(c) Industrial	Y	Y	Y	N	These facilities might have resale of gas to tenants (e.g., food service companies, other industrial users), the piping systems may be extensive, the piping may be under pavement or hard-packed surfaces causing leaking gas to migrate, and leaks could affect large numbers of people.
		(d) Amusement parks	Y	Y	Y	N	These facilities may resell gas to food service vendors.
		(e) Others	Y	Y	Y	N	
6	Publicly-owned small gas piping systems other than master meters (e.g., prisons, schools with multiple buildings, publicly-owned hospital complexes)	N	N	N	N		
7	Commercial small gas piping systems other than master meters (e.g., hospital complexes, greenhouse complexes, nursing home facilities.)	N	N	N	N		
8	Apartment complex small gas piping systems other than master meters	N	N	N	N		

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APPENDIX B – CONTINUED						
TYPES OF SMALL GAS PIPING SYSTEMS IN WASHINGTON						
Item	Description	Master Meter (Y / N)	Federal Regulations Apply (Y / N)	State Rules Apply (Y / N)	Industry Codes Apply to O&M (Y / N)	Comments
9	Industrial small gas piping systems other than master meters (e.g., large industrial facilities with multiple buildings)	N	N	N	N	These facilities have no resale of gas to other entities (e.g., food service company). However, the piping systems may be extensive, the piping may be under pavement or hard-packed surfaces causing leaking gas to migrate, and leaks could affect large numbers of people.
10	Landfill gas piping systems	N / A	N / A	N / A	N / A	Currently there are no landfill gas piping systems in Washington, other than landfill gas collection systems. Generally, landfill gas piping systems become jurisdictional to the 49 CFR Part 192 regulations when gas is transported off site.

- (1) The regulations in 49 CFR Part 192 do not apply to any pipeline system that transports only petroleum gas or petroleum gas/air mixtures to:
- (a) Fewer than 10 customers, if no portion of the system is located in a public place; or
 - (b) A single customer, if the system is located entirely on the customer's premises (no matter if a portion of the system is located in a public place.)
- (49 CFR §192.1(b)(6))

Note that a propane distribution system that serves fewer than 10 customers is jurisdictional if any part of the system is in a "public place". From paragraph (b) it is clear that a "public place" can exist on private property.

- (2) The UTC believes it does not have the statutory authority to enforce master meter requirements on publicly-owned institutions. However, proposed state legislation for the 2007 session would eliminate the distinction between publicly-owned and privately-owned master meters.

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APPENDIX C

RANKING OF RELATIVE RISK – SUMMARY

Prevention or Response See Section 7.4	Item	Area of Concern See Section 7.4		Most likely Cause or Threat See Section 7.3	Risk See Section 7.2	Probability See Section 7.1	Consequence See Section 7.1	Risk Level	
								Jurisdictional Piping	Non-Jurisdictional Piping
Items that affect PREVENTION of risk events	1	Construction – Materials appropriate for gas pipeline	Use of non-approved plastic pipe	Material or welds	Leak	High	Normal	High	Very high
			Use of non-cathodically protected steel pipe	Corrosion	Leak	High	Normal	High	Very high
	2	Construction – Welding steel and Joining plastic pipe	Improper weld procedures & unqualified welders	Material or welds	Leak	Normal	Normal	Normal	High
			Improper joining procedures & unqualified joiners	Material or welds	Leak	High	Normal	High	Very high
	3	Construction – Awareness of possible odorant problems after large new installation		Material or welds	Leak	Normal	Normal	Normal	High
	4	Construction – In accordance with either the 49 CFR Part 192 regulations or the International Fuel Gas Code, as applicable		Corrosion Material or welds Equipment failure	Leak Overpressure	Normal	Normal	Normal	High
	5	Construction – Installation performed by qualified personnel (operator qualification)		Corrosion Material or welds Equipment failure	Leak Overpressure	Normal	Normal	Normal	High
	6	Periodic leak detection not being performed		(all)	Leak	High	Normal	High	Very high
	7	Corrosion control checks not being performed	Buried pipe	Corrosion	Leak	High	Normal	High	Very High
			Atmospheric	Corrosion	Leak	Low	Low	Low	Low
	8	Periodic inspection of pressure regulators and overpressure protection equipment (if any are on the system)		Equipment failure	Equipment failure	Normal	Normal	Normal	High
	9	Periodic odor checks		(all)	Leak	Normal	Normal	Normal	High

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APPENDIX C – (Continued) RANKING OF RELATIVE RISK – SUMMARY

Prevention or Response See Section 7.4	Item	Area of Concern See Section 7.4		Most likely Cause or Threat See Section 7.3	Risk See Section 7.2	Probability See Section 7.1	Consequence See Section 7.1	Risk Level	
								Jurisdictional Piping	Non-Jurisdictional Piping
Items that affect PREVENTION of risk events	10	Damage prevention program to prevent external damage	Membership in one-call system, if applicable	Excavation	Leak	Normal	Normal	Normal	High
			Ability to locate pipelines	Excavation	Leak	Normal	Normal	Normal	High
	11	Maintenance activities performed by qualified personnel (operator qualification)	Operations Error	Operations Error	Normal	Normal	Normal	Normal	High
	12	Records of inspections – appropriate retention	(all)	Leak Overpressure Asphyxiation	Normal	Normal	Normal	Normal	High
	13	Presence of deep pits and vaults	Operations Error Equipment failure	Asphyxiation	Normal	High	High	High	Very High
Items that affect RESPONSE to risk events	14	Location such that affected personnel have limited means of escape	(all)	Leak Overpressure	Normal	High	High	High	Very High
	15	Location such that a large population could be affected	(all)	Leak Overpressure Asphyxiation	Normal	High	High	High	Very High
	16	Knowing the location of the piping (e.g., sketch or drawing)	(all)	Leak Overpressure Asphyxiation	Normal	Normal	Normal	Normal	High
	17	Knowing the size and type of pipe and its connections (e.g., records)	(all)	Leak Overpressure Asphyxiation	Normal	Normal	Normal	Normal	High
	18	Knowing valve information (e.g., size, type, manufacturer, location)	(all)	Leak Overpressure Asphyxiation	Normal	Normal	Normal	Normal	High
	19	Field marking the pipeline system	(all)	Leak Overpressure Asphyxiation	Normal	Normal	Normal	Normal	High

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APPENDIX C – (Continued)										
RANKING OF RELATIVE RISK – SUMMARY										
Prevention or Response <small>See Section 7.4</small>	Item	Area of Concern <small>See Section 7.4</small>		Most likely Cause or Threat <small>See Section 7.3</small>	Risk <small>See Section 7.2</small>	Probability <small>See Section 7.1</small>	Consequence <small>See Section 7.1</small>	Risk Level		
								<small>Jurisdictional Piping</small>	<small>Non- Jurisdictional Piping</small>	
Items that affect RESPONSE to risk events	20	Periodic valve inspection and partial operation		(all)	Leak Overpressure Asphyxiation	Normal	Normal	Normal	High	
	21	Mini emergency plan and periodic training to be able to react in an emergency	Plan in place		(all)	Leak Overpressure Asphyxiation	Normal	Normal	Normal	High
			Training performed		(all)	Leak Overpressure Asphyxiation	Normal	Normal	Normal	High
			Liaison with Fire and Police		(all)	Leak Overpressure Asphyxiation	Normal	Normal	Normal	High
			Communication with individuals who live and work in vicinity		(all)	Leak Overpressure Asphyxiation	Normal	Normal	Normal	High

Appendix D

Summary of Proposed Rules

In accordance with the provisions in Section 9.4.2 for separate new regulations to cover small gas piping systems, the following is a summary of rules that would cover the areas of concern identified in Section 7.4 and in Appendix C. (Note however, that these proposed rules could not apply to master meter systems unless a waiver is obtained as specified in Sections 9.4.2(a) and Section 9.6.)

Also note that gas piping systems operating over 60 psig should follow the regulations in 49 CFR Part 192.

1. **ENGINEERING and CONSTRUCTION**

- (a) Construction of new piping should be in accordance with the International Fuel Gas Code or 49 CFR Part 192, Subparts B through J. A piping system intended to operate over 60 psig should be constructed in accordance with 49 CFR Part 192, Subparts B through J.
- (b) Welding should be performed using qualified welders and qualified welding procedures, in accordance with either API 1104 or with Section IX of the ASME Boiler and Pressure Vessel Code.
- (c) Joining of plastic pipe should be performed using qualified personnel and qualified joining procedures in accordance with 49 CFR Subpart F.
- (d) Deep pits or vaults, particularly those with manhole-type entries, should not be installed unless there is no practicable alternative. Often valves can be located above ground or buried with a valve box that can be operated from above ground, thus eliminating the need for a deep vault.
- (e) A diagram or drawing of the piping system, showing valve locations, should be available in a readily-accessible location.
- (f) Records should be available (this may not be possible on piping systems constructed prior to the effective date of the rule) on the following.
 - (1) Size and type of pipe, including pipe specifications.
 - (2) Type of connections on the pipeline.
 - (3) Size, type, and manufacturer of valves, including model number if available.

2. **CUSTOMER METERS, SERVICE REGULATORS, and SERVICE LINES**

Operators of small gas piping systems should follow the regulations in 49 CFR Part 192, Subpart H regarding customer meters, service regulators, and service lines.

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3. FIELD LOCATION INFORMATION

- (a) A sketch or map is required showing the location of piping facilities, valves, and service lines. If location information is not available, the best available information shall be used, and corrections shall be made as more accurate information becomes available.
 - (1) A copy of the sketch or map shall be located in the security office at the entrance to the facility (if one exists). This information would be available to fire and other emergency responders.
 - (2) A copy of the sketch or diagram shall be attached to the Mini Emergency Plan (see Section 5 below).
- (b) Where appropriate, the pipe location may be marked in the field. The location should be marked so that branch connections and changes in direction are apparent. This marking should not be used as a substitute for an excavator using the one-call system. Surface markings should only be applied when there is confidence regarding the location of the facility. If there is doubt regarding the location of the facility, marks should not be applied until the facility is exposed for some reason, or the location can be pinpointed through other information. Some acceptable methods to use for field marking include the following.
 - (1) Yellow paint on pavement or buildings.
 - (2) Standard gas pipeline marker meeting the requirements of 49 CFR Part 192, §192.707(d).
 - (3) Commercial markers placed in pavement or ground.
- (c) A copy of the mini emergency plan system should be located in the security office at the entrance to the facility (if one exists). This information would be available to fire and other emergency responders.

4. PERIODIC INSPECTIONS

4.1 Types of Periodic Inspections

- (a) Leak detection, using a leak detection instrument;
- (b) Corrosion control inspections, if the piping is metal;
- (c) Valve inspection and partial operation;
- (d) Inspection of pressure regulators and overpressure protection equipment (if any are on the system);
- (e) Odor check (a sniff test is acceptable); and
- (f) A Check that field marking is intact.

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4.2 Frequency of Inspections

Frequency of inspections should generally conform with the requirements in 49 CFR Part 192.

4.3 Inspection Records

Records of inspections should be retained for 5 years.

5. MINI EMERGENCY PLAN

- (a) The mini emergency plan should be a one-page or two-page document, if possible. It should include the following.
 - (1) Location of gas meter, regulator, and wrench for the emergency shut off valve. If a key is required to access the wrench or the shut off valve, include the location of the key.
 - (2) Name and emergency telephone number of the gas supplier (Local Distribution Company or LDC).
 - (3) Emergency telephone numbers for fire, police, and ambulance.
 - (4) Contact information for the owner of the facility.
 - (5) Picture of the shut-off valve, if practicable.
 - (6) Associated training so that local personnel who might be notified of a gas emergency would know how to respond to an odor or a gas leak complaint, or to a fire or explosion.
- (b) A copy of the sketch or diagram of the piping system (see Section 3(a) above) should be attached to the Mini Emergency Plan.

6. MINI PUBLIC AWARENESS PLAN

The mini-public awareness plan should include the following.

- (a) Name and telephone number of fire official contacted, along with the date last contacted (contact should be made at least once each calendar year).
- (b) Name and telephone number of other officials contacted, along with the date last contacted.
- (c) Periodic (e.g., annual) communication to personnel affected. This could be an article in a newsletter, an item on a bulletin board, part of an information kit for new tenants or employees, or part of new employee training.
- (d) Forwarding to appropriate personnel (e.g., tenants) educational materials received from the local gas supplier or other nearby pipelines.

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7. OPERATOR QUALIFICATION REQUIREMENTS

It is very important that personnel who operate a gas piping system are properly qualified to perform the tasks that they are doing. This importance is reflected by the regulations in 49 CFR Part 192, Subpart N. The Subpart N regulations, however, would be excessively burdensome and inappropriate for small operators. For example, Subpart O requires each operator to determine for itself what a covered task is. It may be more appropriate for small operators to establish "standard" covered tasks that they could use.

The following is suggested as a groundwork for operator qualification rules that would be applicable for small operators.

- (a) Personnel performing the following tasks should meet the Operator Qualification (OQ) requirements for the applicable task found in the 49 CFR Part 192 regulations.
 - (1) Joining plastic pipe.
 - (2) Making mechanical pipe connections.
 - (3) Performing required inspections.
 - (4) Operating valves.
- (b) A person should be considered OQ-qualified for a particular task if the person is able to provide documentation showing that the person has been OQ-qualified by any entity, such as the person's employer, a utility, or another contractor. It should be made clear in the rule that any operator whose OQ qualification is used by a small operator will not incur any liability for such use (this issue was stressed in the October 2006 Workshop). Furthermore, utility companies should not be required to take any extra actions to make their qualifications accessible by small operators.
- (c) Operators of small gas piping systems may obtain training and qualification testing provided by others such as the Security and Integrity Foundation (SIF), a part of the American Public Gas Association (APGA).
- (d) The owner or operator of a small gas piping system should retain records of persons performing the tasks in Paragraph (a) above. These records should be retained for 5 years.

8. PROPANE PIPING SYSTEMS

Propane has two significant differences when compared to natural gas. First, propane has a greater specific gravity, making it heavier than air. This is very important, because leaking propane will tend to collect or "puddle" in low places. Secondly, propane has a much lower LEL (lower explosive level). Natural gas can ignite when it is in the range of approximately 5 to 15 percent gas in air. Propane can ignite in the range of approximately 2 to 10 percent.

It is important that all small gas piping systems transporting propane gas are jurisdictional to the UTC. See Section 7.1.4(b) regarding additional risks if such systems are not considered to be jurisdictional.

Small gas piping systems transporting propane should follow the same rules as other small gas piping systems, with the exception that the following rules should be added because of the unique properties of propane gas systems.

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- (a) Aboveground structures for housing equipment such as regulators or meters should have open vents near the floor level.
- (b) Equipment such as regulators or meters should not be installed in pits or in underground vaults, except where suitable provisions for forced ventilation are made.
- (c) Relief valve discharge vents should be located and oriented in such a way as to prevent accumulation of the heavy gases at or below ground level.
- (d) Precautions should be made to prevent the accumulation of heavier-than-air gas in excavations made for repair of leaks in underground piping.
- (e) Leak detection of underground piping should be performed using the bar-hole technique with a combustible gas indicator, or with an equivalent leak detection method.
 - (1) It is important that the combustible gas indicator be calibrated for use with propane.
 - (2) Bar holes should be made to the level of the depth of the pipe.
 - (3) Bar holes should normally be no more than 20 feet apart.
 - (4) If the facility is covered with pavement, frost, or ice, sample points should not be more than 20 feet apart. In the case of extensive paving, permanent test points should be considered, particularly in low places.
 - (5) Readings should be taken at the bottom of the bar holes. Samples should be taken at or near the pipe, in the bottom of ditch lines, and at the low point of substructures.
 - (6) Readings should be taken where the facility crosses foreign structures. Propane gas usually does not diffuse or migrate widely, but may travel a considerable distance if it enters a foreign conduit.
 - (7) When testing available openings, readings should be taken at both the top and bottom of the structure.
 - (8) When testing larger structures or basements, floor areas and floor drains should be tested. A perimeter survey of floors and walls should be made because migrating gas may not enter at the pipeline entrance.
 - (9) If a leak indication is found, consideration should be given to the possibility of multiple leaks.

9. UPRATING

If it is necessary to increase the MAOP of a pipeline, the uprating regulations in 49 CFR Part 192, Subpart K should be followed.

10. ANNUAL REPORT

An annual report should be required so that UTC can begin tracking information and trends. Preferably this would be an electronic reporting system, requiring a minimum of time either on the part of the small gas piping system or on the part of the UTC staff. If precise information is not known, a reasonable estimate should be made. The report should include the following information.

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- (a) Is there underground piping?
- (b) Type of gas in the pipe? ___ Natural gas ___ Propane ___ Landfill gas
- (c) Total length of underground piping (in feet)(best approximation)
- (d) Material:
 - (1) Carbon steel
 - (2) Stainless steel
 - (3) Polyethylene plastic
 - (4) Other plastic
 - (5) Copper
 - (6) Other
- (e) If carbon steel, is it cathodically protected?
- (f) If there is cathodic protection are anodes or rectifiers used?
- (g) Original installation date (may be estimated).
- (h) Is a valve(s) readily accessible to shut off the flow in an emergency?
- (i) Date of last periodic inspection.
 - (1) Number of leaks found. Disposition of each leak (may be summarized).
 - (2) Number of repairs made.
 - (3) Valves inspected and partially operated?
 - (4) Any valves that required scheduled repair or replacement?
 - (5) If buried steel pipe, were pipe-to-soil tests taken?
 - (6) If rectifier, was it inspected every two months?
 - (7) Any corrosion control items that required scheduled repair?
 - (8) Was odor readily apparent?
 - (9) If pressure regulators or overpressure protection equipment, were they inspected?
 - (10) Any repairs that required scheduling?
 - (11) Are pipeline markers intact?
 - (12) Was at least one emergency plan training exercise conducted? (A table-top discussion is acceptable.)
 - (13) Was liaison performed with the Fire Department personnel?
 - (14) Was communication conducted with affected public?
- (j) One-call Locate Requests
 - (1) How many one-call locate requests were received?
 - (2) How many one-call field locates were made?
- (k) Incident Information
 - (3) Summarize any incidents that occurred during the reporting year.
 - (4) Did any explosions occur? Please explain.
- (l) New construction
 - (1) Was there any new construction? If so, please describe.
 - (2) Was there any replacement of facilities? If so, please describe.
 - (3) Was there any abandonment of facilities? If so, please describe.

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11. INSPECTION REPORT FORM

A standard inspection report form should be used by UTC inspectors when performing inspections of small gas piping systems. This form should cover the 21 areas of concern identified in Section 7.4 and shown in Appendix C, and the additional concerns related to propane piping systems discussed in Section 9.3 of the report and in Section 8 of this appendix. Attached is a suggested format for an inspection report form.