Steven L. Beshear
Governor

Leonard K. Peters
Secretary
Energy and Environment Cabinet

Commonwealth of Kentucky
Public Service Commission
211 Sower Blvd.
P.O. Box 615
Frankfort, Kentucky 40602-0615
Telephone: (502) 564-3940
Fax: (502) 564-3460
psc.ky.gov

David L. Armstrong
Chairman

James W. Gardner
Vice Chairman

Linda Breathitt
Commissioner

December 10, 2012

PARTIES OF RECORD

Re: Case No. 2012-00362

The attached letter received via electronic mail message has been filed in the record of the above referenced case, along with a hard copy of the manuals referenced.

Sincerely,

Jeff Derouen
Executive Director

Attachment

Cc: Parties of record

Honaker, Allyson (PSC)

From: Reed N Moore, Jr <reed@reedmoorelaw.com>
Sent: Monday, December 10, 2012 2:40 PM
To: Honaker, Allyson (PSC)
Cc: MayorJeff Proffitt; Jennifer Arms
Subject: City Of Tompkinsville Gas System

Please consider this email my request to officially file a copy of the City of Tompkinsville manuals in the official PSC record that have been provided to Commission Staff previously, specifically those discussed in the informal conference recently held.

Thank you for your courtesy,

Reed Moore, Jr.

Tompkinsville
Natural Gas

DRUG AND ALCOHOL PROCEDURES

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PUBLIC SERVICE
COMMISSION

CITY OF TOMPKINSVILLE

ORDINANCE NO. 05-9-22A

ORDINANCE AMENDING ORDINANCE NO. OS-5-C, CREATING A DRUG AND ALCOHOL POLICY FOR ALL EMPLOYEES OF THE CITY OF TOMPKINSVILLE, KENTUCKY

THAT, WHEREAS, on June 23,2005, the City of Tompkinsville adopted, on second reading. Ordinance No. 05-5-C, creating a drug and alcohol policy for all employees of the City of Tompkinsville, Kentucky and

WHEREAS, the City Commission desires to amend said Ordinance to provide for random drug testing for ail city employees;

NOW, THEREFORE, BE IT HEREBY ORDAINED by the City of Tompkinsville, Kentucky, that Ordinance No. 05-5-C shall be. and hereby is, amended to read. in its entirety, as follows:

THAT, WHEREAS, the City of Tompkinsville, Kentucky ("City"), is committed to ensuring a safe, drug free, and alcohol free working environment for its employees and the customers they serve;

WHEREAS, it is the City's Intention to prohibit drug and alcohol use in the workplace: and,

WHEREAS, there is not currently in effect a comprehensive drug and alcohol policy applicable to all City employees;

NOW, THEREFORE, BE IT HEREBY ORDAINED by the City of Tompkinsville. Kentucky, as follows:

SECTION ONE: The City prohibits the following actions by all City employees at all times while on City property, while conducting City business, and/or operating City motor vehicles, ("Employee" shall be defined as each, every, any and all full-time and part-time non-elected officer and employee of the City, whether hired or appointed):

(a) The use, possession, solicitation for, sale, dispensing, distribution, or manufacture of narcotics or other legal or illegal drugs, intoxicants, controlled substances, alcohol, in any amount or in any manner, and/or prescription medications not prescribed for the employee's use while on City property or while performing the employee's job off City property or in City motor vehicles. In addition, the City strictly prohibits the misuse of alcohol and/or legal drugs.

(b) Being impaired or under the influence of legal or illegal drugs or alcohol on City property or while performing the employee's job off City property or in City motor vehicles, except in those cases where the employee has followed the notification procedure set forth herein for prescription medications. For purposes of alcohol, the employee shall be considered impaired or under the influence If testing reveals an alcohol concentration of .02 or higher. For purposes of all other drugs. intoxicants, or controlled substances, legal or illegal, iftesting reveals the mere presence, at any level, of such substances in the employee's system, the employee shall be considered impaired or under the influence.

SECTION TWO: It is the policy of the City to conduct pre-employment drug testing of all applicants in an effort to prevent hiring individuals who misuse alcohol and drugs. The following provisions apply to pre-employment drug testing:

(a) After a conditional offer of hire is made to an applicant, he or she shall be required to submit to pre-employment drug and alcohol testing and employment is contingent upon passing the test. A positive test will require the City to rescind the conditional offer of employment and the applicant will be ineligible to re-apply for a period of one year. Upon re-applying, the applicant will be asked to provide evidence of evaluation by a substance abuse professional and/or evidence of successful completion of a rehabilitation program.

(b) The City shall inform the applicant in writing of the testing requirements and applicants must sign a form acknowledging that they know they will be tested.

(c) Passing a drug test is a condition of employment and shall be stated in newspaper notices and other forms of vacancy announcements. All appointments to established positions within the City shall be contingent upon successfully completing a drug and alcohol test as a condition of continued employment.

(d) If a pre-employment drug test is canceled, the City shall require the employee or applicant or appointee to submit to and pass another test.

SECTION THREE: All City employees will be required to immediately take a drug and alcohol test ifhe or she is involved in a work place incident that results in injury to the employee or any other person, or if damage occurs to any property. If an employee is unconscious or otherwise unable to evidence consent to the testing procedure, the medical facility shall collect the sample and the Employee's prior signed acknowledgment of this policy, on file with the City Clerk, shall be considered sufficient authorization to conduct the testing and obtain the results from the testing. Testing for alcohol must be completed within 8 hours and the drug screen must be completed within 32 hours after the work place Incident. If testing is unable to be performed within the aforementioned time frames, the employee's supervisor shall record the reason the testing was not so conducted. Failure to submit to the test, or If the employee tests positive for alcohol or drugs, shall constitute grounds for immediate termination.

SECTION FOUR: Alcohol and/or drug testing will be conducted if there is a "reasonable suspicion" that the employee is impaired or under the influence of legal or illegal drugs, lntoxlcants, controlled substances, or alcohol. The following provisions apply to "reasonable suspicion" testing:

(a) "Reasonable suspicion" testing must be based on specific, simultaneously describable observations concerning the behavior, appearance, actions, speech, or body or breath odors of the employee.

(b) The supervisor making the observations leading to a test under these circumstances must prepare and Sign a record of his or her observations.

(c) Testing for alcohol must be completed within 8 hours and the drug screen must be completed within 32 hours after the work place incident. If testing is unable to be performed within the aforementioned time frames, the employee's supervisor shall record the reason the testing was not so conducted.

(d) Failure to submit to the test, or if the employee tests positive for alcohol or drugs, shall constitute grounds for immediate termination.

SECTION FIVE: For those employees who are regulated by the Department of Transportation, all drug and/or alcohol testing will be conducted to the extent and in the manner provided for in the Department of Transportation agency regulations. Such testing will include random drug and alcohol testing for applicable employees.

SECTION SIX: "Drug and/or alcohol testing", as used herein, shall include, but not be limited to, testing for alcohol, marijuana, cocaine, phencyclidine, opiates, and amphetamines.

SECTION SEVEN: All City employees shall be required to execute a written acknowledgment of this drug arid alcohol policy and thereby consent to testing as outlined herein and the release of the test results to CIty Clerk.

SECTION EIGHT: If a City employee has been prescribed medication by his or her doctor that alters physical or mental ability. the City employee must notify his or her supervisor, in writing, immediately upon being prescribed the medication. who shall determine whether temporary job reassignment/medical leave is warranted until the treatment is finished. The supervisor shall place the employee's written notification- in his or her personnel file and shall also record, in writing, the determination made as to temporary job reassignment/medical leave. Unless this notification procedure is followed by the employee. if a drug test is performed and is positive for the presence of prescription medications. such positive results shall be considered a policy violation and shall constitute grounds for immediate termination.

SECTION NINE: All City employees shall be subject to random drug and/or alcohol testing.

SECTION TEN: The normal method of drug and/or alcohol testing shall be to obtain a urine sample from the employee, but in case of the inability of the employee to produce a urine sample, the employee shall be immediately transported to or directed to appear at a facility qualified to obtain a blood sample for testing and the employee shall promptly allow a blood sample to be drawn The blood sample shall be promptly submitted to a qualified testing facility.

SECTION ELEVEN: Employees must notify his or her supervisor within twenty-four (24) hours of any arrest or conviction of a criminal controlled substance statute.

SECTION TWELVE: Failure to comply with this drug and alcohol policy, in any respect. will result in disciplinary action, up to and including termination, for the first incident without prior notification or warning

SECTION: THIRTEEN: This ordinance shall take effect upon its passage and publication as required by law.

Operator Qualification

Program

For

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PUBLIC SERVICE
COMMISSION

Martin Contracting, Inc.

Performing work

For

Natural Gas Distribution

Companies

Martin Contracting, Inc.

2371 Irvine Road

Richmond, Kentucky 40475

Table of Contents

1. INTRODUCTION

1.1. Scope

The Office of Pipeline Safety (under the Department of Transportation's _Research and Special Programs Administration_) issued a final rule for Operator Qualification on August 27, 1999. This final rule, *Pipeline Safety: Qualification of Pipeline Personnel*, is set forth in 49 CFR subparts 192.801 through 192.809. A copy of the final rule and its preamble are included in Appendix A of this OQ Program. The final rule became effective October 26, 1999 ad amended March 3, 2005.

The following Operator Qualification Program (OQ Program) identifies the procedures that Martin Contracting, Inc. will use to comply with these minimum pipeline safety regulations and the Operators OQ requirements for contractors.

Martin Contracting, Inc. is committed to operate safely by ensuring that it has a qualified workforce and that its operations comply with relevant Federal Pipeline Safety Regulations. Shawn Martin with Martin Contracting, Inc. is responsible for the Operator Qualification plan being implemented as written.

1.2. APPLICATION

This OQ Program applies to all individuals given authority by Martin Contracting, Inc. to perform covered tasks as defined herein, whether they are employed by

- Martin Contracting, Inc.
- A sub-contractor or
- Any other entity performing covered tasks on behalf of Martin Contracting Corporation for the Operator

1.3. Key OQ Program Dates

This OQ Program became effective on October 26th, 2001 and was revised as listed in **Appendix B** in September 2008.

Martin Contracting, Inc. will make future revisions to its OQ Program when required by The Operator and for safe and efficient operation of the Operators natural gas distribution system. Documentation of such changes will be listed in **Appendix B** of this OQ Program.

All individuals authorized by Martin Contracting, Inc. to perform respective cover tasks will be qualified or prior to performing respective Covered Tasks after this date, if the individual is not under the direct supervision of someone who is qualified to perform the Covered Task.

2. DEFINITIONS

Abnormal Operating Condition- A condition identified by the Operator, that may include a malfunction of a component or a deviation from normal operations that may indicate an operating condition that could exceed design limits or result in hazard(s) to persons, property, or the environment.

Covered Task- An activity, identified by the Operator, that:

- is performed on a pipeline facility;
- is an operations or maintenance task;
- is performed as a requirement of 49 CFR part 192; and
- affects the operation or integrity of the pipeline.

Direct Observations- Observation of an unqualified individual(s) during the performance of a Covered Task by an individual who is qualified to perform the task(s) at hand. The observer must be in direct visual and verbal contract with the individual(s) and must be able to take immediate and effective corrective action if incorrect procedures or AOCs are observed.

Evaluation- A documented process, established by the Operator, to determine an individual's ability to perform a Covered Task.

Evaluator - A person who composes methods of evaluation and/or the person who performs evaluations. An evaluator should possess the required knowledge to ascertain an individual's ability to perform covered tasks and to substantiate an individual's ability to recognize and react to abnormal operating conditions that may be reasonably expected to surface while performing those tasks. Evaluators must have attended training classes required by Industrial Service and Kentucky Gas Association prior to performing evaluations

Individual - An employee of Martin Contracting, Inc. or an employee of their sub-contractors who, on behalf of Martin Contracting, Inc. performs one or more Covered Tasks identified by the Operator.

Knowledge, Skills, and Abilities (KSA) - An appropriate combination of information, craftsmanship, and proficiency that allows an individual to perform Covered Task(s) in a competent manner.

Operator- The person who own and/or operates natural gas pipeline facilities regulated by 49 CFR Part 192.

Pipeline Facility- Pipelines, rights-of-way, and any equipment, facility, or building used in the transportation of natural gas.

Pipeline or Pipeline System- All parts of a pipeline facility which contain natural gas including, but not limited to, pipe, headers, valves, regulator stations, meters, and other controlling or measuring devices connected to the pipeline.

Qualified Individual- An individual who has been through the evaluation process and can (a) perform assigned Covered Tasks and (b) recognize and react to abnormal operating conditions that may be reasonably expected to surface while performing those tasks.

Task- A piece of work assigned to or expected for an individual.

3. COVERED TASKS

3.1. Identification of Covered Tasks (192.805 a)

Martin Contracting, Inc. will use Covered Tasks identified by the Kentucky Gas Association. KGA conducted a job task analysis of activities performed on pipeline facilities. It then applied the following four-part test (as set forth in 49 CFR 192.801) to each of the identified activities to determine which activities were Covered Tasks:

1. **Is the task performed on a pipeline facility?**
2. **Is the task an operations or maintenance task;**
3. **Is the task performed as a requirement of 49 CFR Part 192; and**
4. **Does the task effect the operation or integrity of the pipeline?**

3.2 List of Covered Tasks

Covered task for Martin Contracting, Inc. are listed in **Appendix C** of this OQ Program.

3.3 Assignment of Covered Tasks

Martin Contracting, Inc. will assign work based on which of its employees are qualified to perform respective Covered Tasks on the Operator's facilities.

4. EVALUATION/QUALIFICATION PROCESS AND METHODS (192.805 B)

4.1. General

Evaluations shall be objective, consistent process that documents an individual's ability to perform the Covered Task. This includes the individual's ability to recognize and react to abnormal operating conditions that the Operator, could reasonably anticipate qualified employees of Martin Contracting, Inc. to encounter while performing the Covered Task.

Evaluators responsible for evaluating an individual's qualification to perform respective Covered Tasks must be acceptable to the Operator and have the required knowledge, through training or experience, to ascertain an individual's ability: (1) to perform Covered Tasks; and (2) to recognize and react to abnormal operating conditions that might surface while performing those tasks. A list of these recognized evaluation resources are maintained Appendix D of this OQ Program.

4.2. Evaluation Methods

Evaluation methods and qualification criteria applied to a Covered Task will vary from task to task. The evaluation method chosen for any specific Covered Task must be acceptable to the Operator and includes one or more of the following:

- Written examination
- Oral examination
- Observation during:
    - Performance on the job

  NOTE: This method will not be used as the sole evaluation method for qualification after December 16, 2004.
    - On-the-job training
    - Simulation
- Other forms of assessment (i.e. third party schools, recognized evaluation services, etc.)

4.3 Types of Evaluation/Qualification

4.3.1. Transitional qualification: The qualification of individuals who (1) performed one or more Covered Tasks on a regular basis prior to August 27, 1999; and (2) qualify to perform those same Covered Tasks, according to this Plan, prior to October 28, 2002.

4.3.2 Initial qualification: The qualification of individuals who did not perform a particular Covered Task on a regular basis prior to August 27, 1999 (the effective date). NOTE: Initial qualification will be used for new employees hired after August 27, 1999. NOTE: **The Operator Distribution does not accept Work Performance History Review as an acceptable method of qualification.**

4.3.3 Subsequent qualification: The future evaluation of an individual's qualification to perform one or more Covered Tasks, after the individual's transitional or initial qualification to perform the same Covered tasks will be at intervals established by the operator, The Operator.

5. USE OF NON-QUALIFIED INDIVIDUALS (192.805 C)

Martin Contracting, Inc. permits non-qualified individuals to perform Covered Tasks as directed by the Operator.

The Operator permits non-qualified individuals to perform Covered Tasks under certain circumstances, including but not limited to, the non-qualified individual's participation in on-the-job training or when working as part of a crew. However, under all circumstances when using non-qualified individuals, the following conditions shall be met.

In compliance with statutory requirements, non-qualified individuals shall not under any circumstances perform the following identified covered tasks:

E-1 Welding and E-2 Performing non-destructive Testing on Steel Welds

F-1 Plastic Fusion

F-2 Joining by Mechanical Fittings

L-1 Tapping Pipelines

Non- qualified individuals may perform a covered task when all of the following conditions exist:

A qualified individual is assigned to direct and observe non-qualified individual(s) during the performance of a Covered Task.

A qualified individual is able to take immediate corrective actions when necessary.

The qualified individual is responsible for the performance of the Covered Task

The ratio of non-qualified individuals to a qualified individual is kept to a safe and controllable minimum.

6. PERFORMANCE CONTRIBUTING TO AN INCIDENT (192.805 D)

If there is reason to believe that an individual's performance of a Covered Task contributed to an incident, as defined in 49 CFR Part 191. The Operator and Martin Contracting, Inc. will initiate an evaluation of that individual's qualification to perform that Covered Task(s). The Operator will make the final decision regarding the performance of any identified Covered Task(s) on the Operator facilities.

6.1 Review Process

- A review will be initiated to determine if reasonable cause exists to evaluate an individual's qualification to perform the Covered Task(s) in question.
- If there is reason to believe that an individual is no longer qualified to perform a Covered Task, that individual's performance of the Covered Task will be evaluated.
- The individual shall not perform the Covered Task(s) unsupervised until the evaluation is completed and any necessary re-qualification(s) steps have been completed.
- Martin Contracting, Inc. along with the Operator will evaluate the individual in accordance with this OQ Program
- During the investigation the individual(s) will not perform the Covered Task(s) that may have contributed to the incident unless under the direct observation and responsibility of a qualified individual.

7. REASONABLE CAUSE TO VERIFY QUALIFICATION (192.805 e)

Martin Contracting, Inc. will evaluate or require the evaluation of an individual if there is reason to believe that the individual is no longer qualified to perform a Covered Task. Concerns regarding an individual's ability to perform a Covered Task may be prompted by a number of circumstances and reported to Martin Contracting, Inc. or the Operator by any person.

Possible reasons to verify an individual's qualification(s) include but are not limited to:

- Loss of motor skills, vision, impairment, etc.;
- Observation while performing work assignments;
- Statement from the individual;
- Prolonged period of non-performance of the Covered Tasks;
- Request by the Operator, The Operator
- Absenteeism

The Operator will make the final decision regarding the evaluation and performance of any identified Covered Task(s) on The Operator facilities.

8. MANAGEMENT OF CHANGE (192.805 e)

Martin Contracting, Inc. will communicate changes that affect the performance of a Covered Task to the individuals who perform that Covered Task. A change may be significant enough to require changes to the qualification process or additional evaluations. **Appendix E** contains an on-going list of changes that required communication to qualified individuals after the effective date of the OQ Program Notification of Changes received from The Operator will be covered with affected employee's and will submit a copy of the form back to The Operator with employee's signatures.

These changes may include but are not limited to:

- modifications to the Operators policies or procedures
- changes in state or federal regulations;
- Use of new equipment and/or technology that affects Covered Tasks; and
- New information from equipment or product manufacturers that affects Covered Tasks.
- Required changes from the Operator.

9. SUBSEQUENT QUALIFICATION INTERVALS (192.805 g)

The future evaluation of an individual's qualification to perform one or more Covered Tasks, after the individual's transitional or initial qualification to perform the same Covered Tasks, will be at intervals established by the Operator and as listed in **Appendix C**.

10. TRAINING KNOWLEDGE, SKILL, and ABILITIES (192.805 h)

Martin Contracting, Inc. ensures that training is administered for each individual performing Covered Tasks. Appropriate training will be administered to ensure the safe operation of the Operators pipeline facilities. Martin Contracting, Inc. ensures training includes the knowledge, skills, and abilities to safely perform the Covered Task(s) and is acceptable to the Operator.

Examples requiring training include but are not limited to:

1. New Hires (On-the-Job training (OJT) and classroom)

2. Individuals taking on new Covered Task(s) (New position or expanded responsibilities)

3. Individuals who fail one or more qualification evaluations.

11. MODIFICATION TO OPERATOR QUALIFICATION PLAN (192.805 i)

When a modification to the Martin Contracting, Inc. OQ program is determined to be significant, Martin Contracting, Inc. will complete a Notification of Change form (Appendix B) outlining the modification. Martin Contracting, Inc. will communicate the modification to the Operator.

12. RECORD KEEPING (192.807)

Martin Contracting, Inc. will ensure records demonstrating an individual's qualification to perform various Covered Tasks are maintained using one or more of the following:

- Electronic qualification results;
- Hard copy of qualification results' and/or
- Other appropriate methods

Qualification records will include the following information:

- Identification of qualified individuals;
- Identification of the evaluator;
- Identification of the covered tasks the individual is qualified to perform;
- Dates of qualifications; and
- Qualification methods used.

Records supporting an individual's current qualification will be maintained while the individual is performing the Covered Task. Records of prior qualification and records of individuals no longer performing covered tasks will be retained for a period of five years from the date the task(s) were last performed. Records will be maintained by Martin Contracting, Inc. office located at 308 Spangler Drive Suite 5, Richmond, Kentucky 40475.

All records and supporting documentation verifying Martin Contracting, Inc. is compliant with Federal and State DOT 192 Subpart N; requirements will be made available in a timely manner to the Operator upon request.

Appendix A

Final Rule and Preamble

For

Operator Qualification:

"Pipeline Safety: Qualification of Pipeline Personnel"

(49 CFR Subparts 192.801 through 192.809)

Issued By The

Office of Pipeline Safety
Research and Special Programs Administration
Department of Transportation

On

August 27, 1999

As amended in the Federal Register on Thursday, March 3, 2005

Subpart N- Qualification of Pipeline Personnel

§ 192.801 Scope.

(a) This subpart prescribes the minimum requirements of operator qualification of individuals performing covered tasks on a pipeline facility.
(b) For the purpose of this subpart a covered task is an activity, identified by the operator, that:

(1) Is performed on a pipeline facility;
(2) Is an operations or maintenance task?
(3) Is performed as a requirement of this part; and
(4) Affects the operation or integrity of the pipeline.

§ 192.803 Definitions

Abnormal operating condition means a condition identified by the operator that may indicate a malfunction of a component or deviation from normal operations that may:

(a) Indicate a condition exceeding design limits; or
(b) Result in a hazard(s) to persons, property, or the environment.

Evaluation means a process established and documented by the operator, to determine an individual's ability to perform a covered task by any of the following:

(b) Written examination;
(c) Oral examination;
(d) Work performance history review;
(e) Observation during
    (1)Performance on the job. (Cannot be the sole method of evaluation)
    (2) On the job training.
    (3) Simulations; or
(f) Other forms of assessment

Qualified means that an individual has been evaluated and can:

(1) Perform assigned covered tasks; and
(2) Recognize and react to abnormal operating conditions.

§ 192.805 Qualification Program

Each operator shall have and follow a written qualification program. The program shall include provisions to:

(a) Identify covered tasks;
(b) Ensure through evaluation that individuals performing covered tasks are qualified;

(c) Allow individuals that are not qualified pursuant to this subpart to perform a covered task if directed and observed by an individual that is qualified.

(d) Evaluate an individual if the operator has reason to believe that the individual's performance of a covered task contributed to an incident as defined in part 191 of this chapter;

(e) Evaluate an individual if the operator has reason to believe that the individual is no longer qualified to perform a covered task;

(f) Communicate changes that affect covered tasks to individuals performing those tasks.

(g) Identify those covered tasks and the intervals at which evaluations of the individual's qualifications are needed;

(h) After December 16, 2004, provide training as appropriate, to ensure that individuals performing covered task have the necessary knowledge and skills to perform the tasks in a manner that ensures the safe operations of the pipeline facilities; and

(i) After December 16, 2004, notify the Administrator or State agency participating under 49 U.S.C. Charter 601 if the operator significantly modifies the program after the Administrator or State agency has verified that it complies with this section.

§ 192.807 Record keeping

Each operator shall maintain records that demonstrate compliance with this subpart.

(a) Qualification records shall include:

(1) Identification of qualified individual(s);

(2) Identification of the covered tasks the individual is qualified to perform;

(3) Date(s) of current qualification;

(4) Qualification method(s).

(b) Records supporting an individual's current qualification shall be maintained while the individual is performing the covered task. Records of prior qualification and records of individuals no longer performing covered tasks shall be retained for a period of five years.

§ 192.809 General

(a) Operators must have a written qualification program by April 27, 2001. The program must be available for review by the Administrator or by a state agency participating under 49 U.S.C. 601 if the program is under the authority of the state agency.

(b) Operators must complete the qualification of individuals performing covered tasks by October 28, 2002.

(c) Work performance history review may be used as a sole evaluation method for individuals who were performing covered task prior to October 26, 1999.

(d) After October 28, 2002, work performance history may not be used as the sole evaluation method.

(e) After December 16, 2004, observation of on-the-job performance may not be used as the sole method of evaluation.

Appendix B

Operator Qualification Program Changes
For
Martin Contracting, Inc.

Date	Affected OQ Program Section	Description of Change and Purpose
5-4-2012	OQ Plan	Development/Implementation of OQ Plan

Appendix C

List of Covered Tasks

Task Number	Covered Task	Subsequent Qualification Period
E-1	Weld on steel pipelines	1 year
E-2	Test welds using non-destructive processes	1 year
F-1	Joining Plastic Pipe	1 year
F-2	Joining Plastic Pipe / Mechanical Coupling	1 year
G-1	Inspect excavations/backfilling activities	3 year
H-1	Install Meter & Regulator	3 year
H-2	Install Service Lines	3 year
I-1	Monitor corrosion control methods used on buried pipelines	3 year
L-1	Tap pipelines under pressure	3 year
L-2	Purging Gas Lines	3 year
M-1	Perform patrol and leakage surveys on gas pipeline facilities	3 year
M-2	Locate and Mark Underground Facilities	3 year
M-3	Testing Pipelines	3 year
M-4	Inspect and Test pressure limit stations	3 year
M-5	Maintain line valves	3 year
M-7	Prevent Accidental Ignition/ AOCs	3 year
M-8	Make field repairs on distribution lines	3 year
M-9	Repair / Protect cast iron pipe	3 year
M-10	Abandon / Deactivate Gas Piping	3 year

Appendix D

Evaluation Resources Recognized By Martin Contracting, Inc.

Resource Name	Covered Task	Resource Description
R.L. Wingate & Associates	All Tasks	On-site / ITS curriculum
Kentucky Gas Association	All Tasks	On-site / ITS curriculum
Bluegrass Instructional Services	All Tasks	On-site / ITS curriculum

Appendix E

Management of Change List

Date	Description of Change	Description of Communication

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PUBLIC SERVICE
COMMISSION

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WELDING DICTIONARY

A.

Accu-Mate™ **(MTE)** - Gun/feeder connection on 75 Series wire feeder uses integrated power pin lock to properly seat gun for optimal feeding, and an all-brass power clamp for improved electrical conduction and durability.

Accu-Pulse™ **(MTE)** - MIG process that delivers precise control of the arc even over tack welds and in tight corners. Provides optimum and precise molten puddle control.

Accu-Rated™ Power **(MTE)** - The standard for measuring engine-driven generator power. Guarantees delivery of all power promised.

Active Arc Stabilizer™ **(MTE)** - Enhances arc starts and provides a softer arc throughout all ranges, with less puddle turbulence and less spatter.

Adaptive Hot Start™ **(MTE)** - Automatically increases the output amperage at the start of a Stick weld, should the start require it. Helps eliminate sticking of the electrode at arc start.

Advanced Active Field Control Technology™ **(MTE)** - A simple and reliable patented way of accurately controlling an engine drive's generator weld output.

Air Carbon Arc Cutting (CAC-A) - A cutting process by which metals are melted by the heat of an arc using a carbon electrode. Molten metal is forced away from the cut by a blast of forced air.

Alternating Current (AC) - An electrical current that reverses its direction at regular intervals, such as 60 cycles alternating current (AC), or 60 hertz.

Aluminum Pulse Hot Start™ **(MTE)** - Automatically provides more arc power to the Millermatic® 350P to eliminate a "cold start" that is inherent with aluminum starts.

Amperage - The measurement of the amount of electricity flowing past a given point in a conductor per second. Current is another name for amperage.

Arc - The physical gap between the end of the electrode and the base metal. The physical gap causes heat due to resistance of current flow and arc rays.

Arc-Drive **(MTE)** - Automatically enhances Stick welding, especially on pipe, by focusing the arc and preventing the electrode from going out.

Auto-Line™ **(MTE)** - Allows for any primary input voltage within a range, single- or three-phase, 50 or 60 Hz. Also adjusts for voltage spikes within the entire range.

Auto-Link® **(MTE)** - Internal inverter power source circuit that automatically links the power source to the primary voltage being applied (230 V or 460 V), without the need for manually linking primary voltage terminals.

Automatic Start at Idle **(MTE)** - Idles engine immediately when started, extending engine life and reducing fuel consumption and noise.

Automatic Welding - Uses equipment which welds without the constant adjusting of controls by the welder or operator. Equipment controls joint alignment by using an automatic sensing device.

Auto-Refire™ (MTE) - Automatically controls the pilot arc when cutting expanded metal or multiple pieces of metal, without manual re-triggering.

Auto Remote Sense™ (MTE) - Automatically switches machine from panel to remote control with remote connected. Available on Dimension™ NT 450, XMT® 350, Trailblazer® Series, and PRO 300. Eliminates confusion and need for panel/remote switch.

Auto Stop™ **(MTE)** - Allows a TIG arc to be stopped without the loss of shielding gas on Trailblazer® Series.

Axcess™ File Management **(MTE)** - Software that turns a standard Palm handheld into a data card and a remote pendant for all Axcess systems. Allows e-mailing, storage, and transfer of welding programs.

C

Constant Current (CC) Welding Machine - These welding machines have limited maximum short circuit current. They have a negative volt-amp curve and are often referred to as "droopers".

Constant-Speed Wire Feeder - Feeder operates from 24 or 115 VAC supplied by the welding power source.

Constant Voltage (CV), Constant Potential (CP) Welding Machine - This type of welding machine output maintains a relatively stable, consistent voltage regardless of the amperage output. It results in a relatively flat volt-amp curve.

Cool-On-Demand™ **(MTE)** - Integrated cooler runs only when needed on Syncrowave® 250 DX and 350 LX.

Current - Another name for amperage. The amount of electricity flowing past a point in a conductor every second.

D

Defect - One or more discontinuities that cause a testing failure in a weld.

Dig - Also called Arc Control. Gives a power source variable additional amperage during low voltage (short arc length) conditions while welding. Helps avoid "sticking" stick electrodes when a short arc length is used.

Direct Current (DC) - Flows in one direction and does not reverse its direction of flow as does alternating current.

Direct Current Electrode Negative (DCEN) - The direction of current flow through a welding circuit when the electrode lead is connected to the negative terminal and the work lead is connected to the positive terminal of a DC welding machine. Also called direct current, straight polarity (DCSP).

Direct Current Electrode Positive (DCEP) - The direction of current flow through a welding circuit when the electrode lead is connected to a positive terminal and the work lead is connected to a negative terminal to a DC welding machine. Also called direct current, reverse polarity (DCRP).

Dual Power Option™ **(MTE)** - Gives the option on the PipePro™ 304 engine drive to use 230 volt single- or three-phase electric input power, eliminating engine wear, noise and emissions, as well as fuel costs.

Duty Cycle - The number of minutes out of a 10-minute time period an arc welding machine can be operated at maximum rated output. An example would be 60% duty cycle at 300 amps. This would mean that at 300 amps the welding machine can be used for 6 minutes and then must be allowed to cool with the fan motor running for 4 minutes.

E

Engine Save Start™ (MTE) - Idles engine 3 - 4 seconds after starting on Trailblazer® 275 DC and 302. Extends engine life and reduces fuel consumption.

F

Fan-On-Demand™ **(MTE)** - Internal power source cooling system that only works when needed, keeping internal components cleaner.

FasTip™ Contact Tip **(MTE)** - Patented, single-turn for quick change - no tools needed!

Fixed Automation - Automated, electronically controlled welding system for simple, straight or circular welds.

Flexible Automation - Automated, robotically controlled welding system for complex shapes and applications where welding paths require torch-angle manipulation.

Flux Cored Arc Welding (FCAW) - An arc welding process which melts and joins metals by heating them with an arc between a continuous, consumable electrode wire and the work. Shielding is obtained from a flux contained within the electrode core. Added shielding may or may not be provided from externally supplied gas or gas mixture.

G

Ground Connection - A safety connection from a welding machine frame to the earth. See Workpiece Connection for the difference between work connection and ground connection.

Ground Lead - When referring to the connection from the welding machine to the work, see preferred term Workpiece Lead.

Gun-On-Demand™ **(MTE)** - Allows you to use either a standard gun or a Spoolmatic® gun on Millermatic® 210, 251, and 350 without flipping a switch. The machine senses which gun you are using when you pull the trigger.

H

Hertz - Hertz is often referred to as "cycles per second". In the United States, the frequency or directional change of alternating current is usually 60 hertz.

High Frequency - Covers the entire frequency spectrum above 50,000 Hz. Used in TIG welding for arc ignition and stabilization.

Hot Start™ **(MTE)** - Used on some Stick (SMAW) machines to make it easier to start difficult-to-start electrodes. Used for arc starting only.

I

Inverter - Power source which increases the frequency of the incoming primary power, thus providing for a smaller size machine and improved electrical characteristics for welding, such as faster response time and more control for pulse welding.

K

KVA (Kilovolt-amperes) - Kilovolt-amperes. The total volts times amps divided by 1,000, demanded by a welding power source from the primary power furnished by the utility company.

KW **(Kilowatts)** - Primary KW is the actual power used by the power source when it is producing its rated output. Secondary KW is the actual power output of the welding power source. Kilowatts are found by taking volts times amps divided by 1,000 and taking into account any power factor.

L

Lift-Arc™ **(MTE)** - This feature allows TIG arc starting without high frequency. Starts the arc at any amperage without contaminating the weld with tungsten.

Low OCV Stick™ **(MTE)** - Reduces OCV on several Maxstar® and Dynasty® models when power source is not in use eliminating need for add-on voltage reducers.

LVC™ (Line Voltage Compensation) **(MTE)** - Keeps the output of a power source constant, regardless of minor fluctuations in input power.

M

Microprocessor - One or more integrated circuits that can be programmed with stored instructions to perform a variety of functions.

MIG (GMAW or Gas Metal Arc Welding) - An arc welding process which joins metals by heating them with an arc. The arc is between a continuously fed filler metal (consumable) electrode and the workpiece. Externally supplied gas or gas mixtures provide shielding. Common MIG welding is also referred to as short circuit transfer. Metal is deposited only when the wire actually touches the work. No metal is transferred across the arc. Another method of MIG welding, spray transfer moves a stream of tiny molten droplets across the arc from the electrode to the weld puddle. Consumables: contact tips, shielding gas, welding wire.

MVP™ (Multi-Voltage Plug) (MTE) - Allows connection of Millermatic® DVI™ or Passport™ to 115- or 230-volt receptacles without tools - just choose the plug that fits the receptacles without tools - just choose the plug that fits the receptacle.

O

Open-Circuit Voltage (OCV) - As the name implies, no current is flowing in the circuit because the circuit is open. The voltage is impressed upon the circuit, however, so that when the circuit is completed, the current will flow immediately.

P

Palm™ OS Compatibility - Replaces the need for data cards and remote control pendants on Axcess models.

PD (Precision Drive) - Wire drive assembly to push difficult wires on the 75 Series wire feeder. Wire guides, drive rolls, and pressure applicator maintain a supportive structure along the entire path of the wire for smooth feeding.

Plasma Arc Cutting - An arc cutting process which severs metal by using a constricted arc to melt a small area of the work. This process can cut all metals that conduct electricity.

Pounds Per Square Inch (psi) - A measurement equal to a mass or weight applied to one square inch of surface area.

Power Efficiency - How well an electrical machine uses the incoming electrical power.

Power Factor Correction - Normally used on single-phase, constant current power sources, to reduce the amount of primary amperage demanded from the power company while welding.

Primary Power - Often referred to as the input line voltage and amperage available to the welding machine from the shop's main power line. Often expressed in watts or kilowatts (KW), primary input power is AC and may be single-phase or three-phase.

Pulsed MIG (MIG-P) - A modified spray transfer process that produces no spatter because the wire does not touch the weld puddle. Applications best suited for pulsed MIG are those currently using the short circuit transfer method for welding steel, 14 gauge (1.8 mm) and up.

Pulsed TIG (TIG-P) - A modified TIG process appropriate for welding thinner materials.

Pulsing - Sequencing and controlling the amount of current, the frequency, and the duration of the welding arc.

R

Rated Load - The amperage and voltage the power source is designed to produce for a given specific duty cycle period. For example, 300 amps, 32 load volts, at 60% duty cycle.

Regulated Metal Deposition (RMD) **(MTE)** - Precisely controlled short-circuit transfer technology, available as an option on Axcess™ models. For spatter reduction, up to 20% reduced heat input, or filling gaps.

Resistance Spot Welding (RSW) - A process in which two pieces of metal are joined by passing current between electrodes positioned on opposite sides of the pieces to be welded. There is no arc with this process.

RMS **(Root Mean Square)** - The "effective" values of measured AC voltage or amperage. RMS equals 0.707 times the maximum, or peak value.

S

Semiautomatic Welding - The equipment controls only the electrode wire feeding. The welding gun movement is controlled by hand.

SharpArc® **(MTE)** - Optimizes the size and shape of the arc cone, bead width and appearance, and puddle fluidity. Available on the Millermatic® 350/350P.

Shielding Gas - Protective gas used to prevent atmospheric contamination of the weld pool.

Single-Phase Circuit - An electrical circuit producing only one alternating cycle within a 360 degree time span.

Smart Fuel Tank **(MTE)** - Tank's design minimizes chance of fuel backflow.

Spatter - The metal particles blown away from the welding arc. These particles do not become part of the completed weld.

Spot Welding - Usually made on materials having some type of overlapping joint design. Can refer to resistance, MIG or TIG spot welding. Resistance spot welds are made from electrodes on both sides of the joint, while TIG and MIG spots are made from one side only.

Squarewave™ - The AC output of a power source that has the ability to rapidly switch between the positive and negative half cycles of alternating current. « View Video »

Stick Welding (SMAW or Shielded Metal Arc) - An arc welding process which melts and joins metals by heating them with an arc, between a covered metal electrode and the work. Shielding gas is obtained from the electrode outer coating, often called flux. Filler metal is primarily obtained from the electrode core.

Submerged Arc Welding (SAW) - A process by which metals are joined by an arc or arcs between a bare metal electrode or electrodes and the work. Shielding is supplied by a granular, fusible material usually brought to the work from a flux hopper.

SunVision™ (MTE) - Allows easy reading of digital meters in direct sunlight or shade on Trailblazer 275 DC and 302.

SureStart™ (MTE) - Provides consistent Axcess™ arc starts by precisely controlling power levels for specific wire and gas combinations.

Syncro Start™ (MTE) - Allows selectable customized arc starts on Syncrowave® 200, 250 DX and 350 LX.

T

Three-Phase Circuit - An electrical circuit delivering three cycles within a 360 degree time span, and the cycles are 120 electrical degrees apart.

TIG Welding (GTAW or Gas Tungsten Arc) - Often called TIG welding (Tungsten Inert Gas), this welding process joins metals by heating them with a tungsten electrode which should not become part of the completed weld. Filler metal is sometimes used and argon inert gas or inert gas mixtures are used for shielding.

Tip Saver Short Circuit Protection™ **(MTE)** - Shuts down output when the MIG contact tip is shorted to the work, on the Millermatic® 135 and 175. Extends contact tip life and protects machine.

Trigger Reset - Permits quick reset at gun rather than at machine.

Torch - A device used in the TIG (GTAW) process to control the position of the electrode, to transfer current to the arc, and to direct the flow of the shielding gas.

Torch Detection™ (MTE) - Syncrowave® 250 DX and 350 LX detect if TIG torch is water- or air-cooled.

Touch Start - A low-voltage, low-amperage arc starting procedure for TIG (GTAW). The tungsten is touched to the workpiece; when the tungsten is lifted from the workpiece an arc is established.

Tri-Cor™ Technology (MTE) - Stabilizer design on the Bobcat 250 that delivers smoother welds and decreased spatter with E7018 electrodes, without sacrificing performance with E6010 electrodes.

Tungsten - Rare metallic element with extremely high melting point (3410° Celsius). Used in manufacturing TIG electrodes.

V

Voltage - The pressure or force that pushes the electrons through a conductor. Voltage does not flow, but causes amperage or current to flow. Voltage is sometimes termed electromotive force (EMF) or difference in potential.

Voltage-Sensing Wire Feeder - Feeder operates from arc voltage generated by welding power source.

Volt-Amp Curve - Graph that shows the output characteristics of a welding power source. Shows voltage and amperage capabilities of a specific machine.

W

WaveWriter™ File Management **(MTE)** - Includes all Axcess™ File Management functions, plus a simple, graphical wave-shaping program for the most demanding pulsed MIG applications.

Weld at Idle™ **(MTE)** - Allows PipePro™ 304 to automatically weld at a quieter, lower RPM, using less fuel. When more output is required, he machine goes to high speed without a change in arc.

Weld Metal - The electrode and base metal that was melted while welding was taking place. This forms the welding bead.

Weld Transfer - Method by which metal is transferred from the wire to the molten puddle.

Wind Tunnel Technology™ **(MTE)** - Internal air flow on many Miller inverters, that protects electrical components and PC boards from contamination, significantly improving reliability. « View Video »

Wire Feed Speed - Expressed in in/min or mm/s, and refers to the speed and amount of filler metal fed into a weld. Generally speaking the higher the wire feed speed, the higher the amperage.

Workpiece Connection - A means to fasten the work lead (work cable) to the work (metal to be welded on). Also, the point at which this connection is made. One type of work connection is made with an adjustable clamp.

Workpiece Lead - The conductor cable or electrical conductor between the arc welding machine and the work.

QUALIFICATION OF WELDING PROCEDURES

Before production welding is started, a detailed procedure specification shall be established and qualified to demonstrate that welds with suitable mechanical properties (such as strength, ductility, and hardness) and soundness can be made by the procedure. The quality of the welds shall be determined by destructive testing. These procedures shall be adhered to, except where a change is specifically authorized by the operator, as provided for in Section 5.4. of the API Standard 1104, 20th Edition, API Std 1104, Errata 2.2008.

The details of each qualified procedure shall be recorded to show the results of the qualifying test. **NOTE:** The procedures shall be maintained as long as the procedure is in use.

Qualification of Welders

The purpose of the welder qualification test is to determine the ability of welders to make sound butt or fillet welds using previously qualified procedures. Before any production welding is performed, welders shall be qualified according to the applicable requirements of API 6.2 through API 6.8. It is the intent of this standard that a welder who satisfactorily completes the procedure qualification test is a qualified welder, provided the number of test specimens required by API 6.5 have been removed, tested, and meet the acceptance criteria of API 5.6, for each welder. Prior to starting the qualification tests, the welder shall be allowed reasonable time to adjust the welding equipment to be used. The welder shall use the same welding technique and proceed with the same speed he/she will use if he/she passes the test and is permitted to do production welding. The qualification of welders shall be conducted in the presence of a representative acceptable to the operator. A welder shall qualify for welding by performing a test on segments of pipe nipples or on full-size pipe nipples, as specified in API 6.2.1. When segments of pipe nipples are used, they shall be supported so that typical flat, vertical, and overhead welds are produced. **NOTE:** Exacting welder qualifications are detailed in API 6.2.2 and API 6.3.2 of the API Standard 1104, 20th Edition, API Std 1104, Errata 2.2008.

A welder may qualify to perform welding on pipe to be operated at a pressure that produces a hoop stress of less than 20% of SMYS by performing a test weld, for that process used. Section I of Appendix C of this part, each welder who is to weld service line connections to a mainline pipe must successfully test under Section II of Appendix C as required for qualification of welders. Welders qualifying under 192.227(b) shall be re-tested each calendar year.

Welding must be performed in accordance with written welding procedures qualified to produce acceptable welds.

For typical pipeline welding, standard API 1104 is most often relied on. The welding procedures should include:

1. Records of the complete results of the procedural qualification test

2. Procedural specification·

3. Identifying the process

4. Identifying the materials

5. Identifying the wall thickness groups

6. Identifying the pipe diameter groups

7. Showing a joint design sketch

8. Designating filler metal and number of beads

9. Designating electrical characteristics

10. Designating flame characteristics

11. Designating positions or roll welding

12. Designating direction of welding

13. Designating maximum time lapse between passes

14. Designating type ofline-up clamp and removal criteria

15. Designating type of cleaning tool used

16. Specifying preheat and post heat practices

17. Designating composition of gas and range of flow rate

18. Designating type and size of shielding flux

19. Designating range of speed of travel for each pass

20. Essential variables Most changes in b. require requalification of the welding procedure. (Refer to API 1104, paragraph 2.4.)

21. Welding and testing of test joint

22. Preparation of specimen

23. Destructive tests - butt welds

24. Tensile strength test

25. Nick break test

26. Root and face bend test

27. Side bend test.

28. Destructive test - fillet welds: Break in weld as specified.

29. Welders who are qualified for the welding procedure to be used must perform welding.

30. The welder shall be qualified under one of the applicable requirements specified.

31. Transmission pipelines

32. API 1104, Section 3; or

33. ASME Boiler and Pressure Vessel Code, Section IX

34. Distribution pipeline

35. API 1104, Section 3;

36. ASME Boiler and Pressure Vessel Code, Section IX; or

37. 49 CFR Part 192, Appendix C, Section I (not acceptable for service line to main connection welding).

38. Service line to main connections

39. API 1104, Section 3;

40. ASME Boiler and Pressure Vessel Code, Section IX; or

41. 49 CFR Part 192, Appendix C, Sections I and II.

42. Welder qualification under API 1104, Section 3.

43. Perform qualification test as specified in the written welding procedure in the presence of the company's

representative.

44. Essential variables (certain changes require re-qualification).

45. For single qualification refer to API 1104, paragraph 3.1 I; or

46. For multiple qualification refer to API 1104, paragraph 3.21.

47. Welding and testing of test joint

48. Preparation of specimen(s)

49. Visual examination

50. Destructive test - butt welds Determine if all or part of these tests is required: 1 Tensile strength test (optional) 2 Nick break test 3 Root and face bend test.

4 Side bend test

51. Destructive tests - fillet welds: Break in weld as specified.

52. Visual inspection

NOTE: Nondestructive radiographic inspection of butt welds only can be done in lieu of (3)(c) above.

This is the operator's option. The standards of acceptability for radiographic inspection are specified in API 1104, paragraph 6.0.

(a) Keep all records:

(b) Detailed test results for each welder.

(c) List of qualified welders and the procedures(s) for which they are qualified.

(d) Welder qualification under 49 CFR Part 192, Appendix C, Section I

(1) Perform qualification test on pipe 12 inches or less in diameter

(2) Use position welding

(3) Preparation must conform to written welding procedure

(4) Destructive test. - root bend test

(5) Visually inspect

(6) Keep all records:

(a) Detailed test results for each welder

(b) List of qualified welders under this procedure

(c) Welder qualification under of 49 CFR Part 192, Appendix C, Sections I and II

(1) Perform c. above

(2) Weld service line connection fitting to a pipe typical of the main using similar position as one would in actual production welding

(3) Destructive test - break, or attempt to break, the fitting off the run pipe

(4) Keep the following records:

(a) Detailed test results for each welder

(b) List of qualified welders under this procedure

(c) Remain qualified under API 1104, Section 3 or ASME Boiler and Pressure Vessel Code, Section IX, if:

(1) Within the preceding six months, welder has welded with the particular welding process (either test or production welding is acceptable), and welder has made a weld and had it tested satisfactorily either destructively or nondestructively. (Refer to 2b(3) for required procedure.)

(2) Remain qualified under either 49 CFR Part 192, Appendix C, Section I or II, if:

(1) Within the preceding 71h. months but at least twice each year, welder has had one production weld cut out, tested, and found acceptable in accordance with the initial qualification test; or,

NOTE: Welders who work only on service lines 2 inches or smaller in diameter may be tested in each 6-month period under 49 CFR Part 192, Section III, Appendix C in lieu off(1) above, but at the same intervals.

(2) Within the preceding 15 months, but at least once each year, welder has re-qualified under 49 CFR Part 192 Appendix C

(3) Production welding

a. Use a welder qualified in a qualified welding procedure.

b. The following items should be part of the written welding procedure:

(1) Weather protection - 49 CFR § 192.23 I

(2) Preparation - 49 CFR § 192.235

(3) Visual Inspection - 49 CFR § 192.241

(4) Nondestructive Testing (under specified conditions) - 49 CFR §192.243. Must meet standards of acceptability in API 1104, Section 6.

c. Miter joint restrictions The use of miter joints is restricted as follows:

(1) If MAOP produces a hoop stress of 30 percent or more SMYS, the joint cannot deflect the pipe more than 3 degrees.

(2) If MAOP produces a hoop stress of more than 10 percent SMYS but less than 30 percent, the joint cannot deflect the pipe more than 12.5 degrees and must have at least one pipe diameter separation from another miter joint.

(3) If MAOP produces a hoop stress of 10 percent of SMYS or less, the joint cannot deflect the pipe more than 90 degrees.

d. Repair or removal of defect requirements is as follows:

(1) Remove or repair all welds that fail to pass the nondestructive test requirements (standards of acceptability in API 1104, Section 6).

(2) Remove all welds that contain cracks that are more than 8 percent of the weld length.

(3) Repairs must have the defect removed down to clean metal and the segment to be repaired must be preheated if conditions exist which would adversely affect the quality of the weld repair. Inspect the repaired weld.

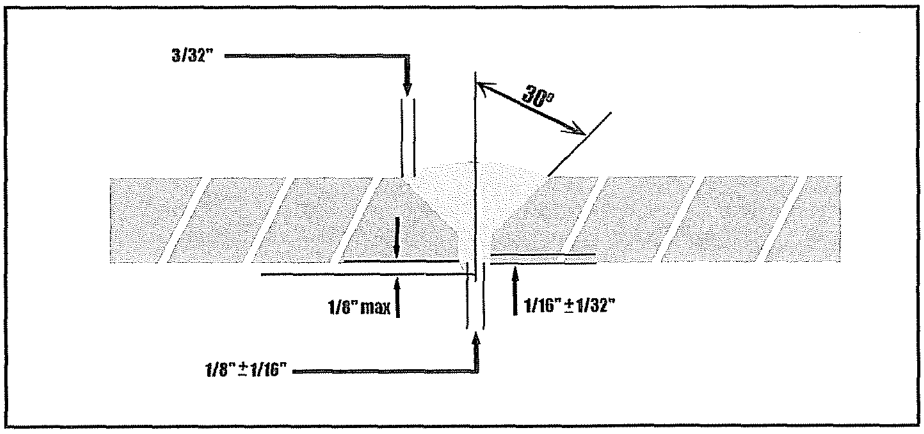
(4) Repair of a crack, or any defect in a previously repaired area, must be in accordance with written weld repair procedures that have been qualified under this guidance manual.

OXY-ACETYLENE FOREHAND BUTT JOINTS IN STEEL PIPE AND FITTINGS

This procedure describes the welding of forehand butt joints in API 5L, 5LX-42 and equivalent materials with similar chemical and physical properties such as ASTM A106, (except cold worked and heat treated materials) in all diameters and wall thicknesses 3/8" and under. The procedure to be followed when making a forehand butt weld is as follows:

JOINT PREPARATION: Generally, all coating shall be removed back at least 9" from the beveled surface prior to welding. However, the thin film coatings only need to be removed back a minimum of 1-1/2". Beveling shall be done with a machine tool or machine flame cutting device, Flame cut surfaces must be smooth and regular, all rust, scale, primer, oil, and other material which may be detrimental to the finish weld must be removed from the welding surfaces.

The joint design shown below is preferred: however, a 37-1/2° bevel may be used. Also, a joint with no land is acceptable.



JOINT DESIGN FOR FOREHAND OXY-ACETYLENE WELD

SUPPORT: The pipe shall be supported to avoid strain on the weld during welding and to prevent movement until the weld has cooled to 600° F.

ALIGNMENT: An approved type of line-up clamp shall be used to center the joint and to minimize high-low, offset resulting from out of roundness shall not exceed 3/64" for wall thickness 1/48" and under, and 3/32" for wall thickness greater than 1/48". Small variations between the internal surfaces may be swage cold. Such swaging shall not extend at least one inch from the ends. Heat may be applied, provided the pipe has not been cold worked in manufacture. If a difference in wall thickness results in an internal or external offset exceeding 3/648 for wall thickness 1/48" and under, and 3/32" for wall thickness greater than 1/48", the thicker section shall be tapered (1 on 4) to meet the thinner section. Back-up rings are prohibited (interfere with the overall quality of the root pass.)

FILLER METAL: Filler metals and fluxes shall be stored and handled so as to avoid damage to them and to the containers in which they are shipped. Those in opened containers shall be protected from deterioration and filler metals which are coated shall be protected from excessive moisture changes. Filler metals and fluxes which show signs of deterioration shall not be used.

***SIZE OF WELDING ROD AND TORCH TIP SIZES**

***WALL TIP TIP TRAVEL WELDING**

***THICKNESS ORIFICE SPEED ROD SIZE**

***SIZE SIZE (IPM)**

***VICTOR/OXWELD/LINDE/HARRIS/SMITH**

DESIGNATED TIP NUMBERS

FRACTIONAL SIZE ORIFICE	TAP DRILL SIZE NUMBER
5/32" or less	#3-#4 #9-#15
1-2 1/8", 3/16"	#3-#4 #9-#15
1-2 1/8", 5/32", 1/4"	#3-#4 #9-#15
1-2 5/32", 3/16", 5/16"	#4 # 15 - #30
1- 2 3/16", 3/8"	#4 #15 - #30
1 - 2 3/16" - 1/4"	#4 #15 - #30

NOTE: Tap drill size numbers may vary from one manufacture to another. Please read the specific manufactures chart and tables before attempting a welding task. Improper sizing of an Oxy-acetylene welding tip may result in the weld being either too cold (no penetration) or too hot (crystalized.)

TACK WELDING: Tack welds shall be approximately 1" in length and have a thickness at the middle equal to 2/3 of the pipe wall thickness. If a tack weld cracks or breaks, the pipe or fitting shall be re-beveled. Tack welds made in preparation for roll welding shall be made in a fixed position and shall be spaced uniformly around the circumference. The minimum number of tacks is as follows:

3" Diameter and Smaller	**3 Tacks**
4"-8" Diameter	**4 Tacks**
10" Diameter	**5 Tacks**
12" Diameter	**6 Tacks**

POSITION: All positions

WELDING: The weld shall be made by the forehand method in either one or two passes using a neutral flame. Only one welder at a time shall be permitted to weld on pipe 6" in diameter or less.

COOLING: There shall be no accelerated cooling of the weld joint until the temperature of the joint is below 600° F.

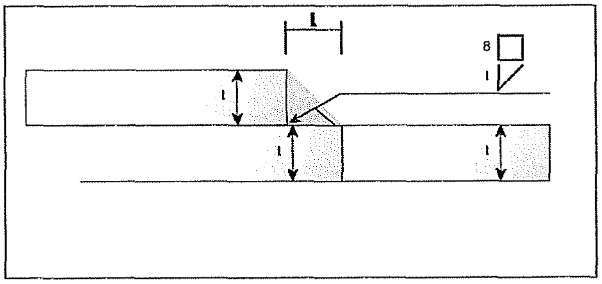
OXY-ACETYLENE WELDING OF FILLET WELDS IN STEEL

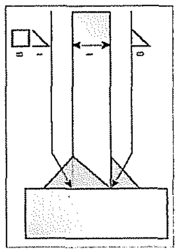
This procedure describes the welding of fillet welds in API 5L, 5LX 42 and equivalent materials with similar chemical and physical properties such as ASTM A106 (except cold worked and heat treated materials) in all diameters and wall thicknesses 3/8" and under.

The procedure to be followed when making a fillet weld is as follows:

JOINT PREPARATION: Generally, all coating shall be removed back at least 9" from the beveled surface prior to welding. However, the thin filmed coatings only need to be removed back a minimum of 1-1/2" all rust, scale, primer, oil and other material which may be detrimental to the finished weld must be removed from the welding surfaces.

The joint design is shown below. For full encirclement type lap joints, the maximum dimension of L is 1.25, t_1, or t_2 whichever is smaller. If the pad thickness of a full encirclement type lap joint is greater than 1.25, t_1 the pad shall be tapered 1 to 4 to a thickness of t_1 at the weld. For pad or saddle type lap joints, the maximum dimension of L is t_1 or t_2, whichever is smaller. If the thickness of a pad or saddle type lap joint is greater than t_1, it shall be tapered 1 on 4 to a thickness of t_1 at the weld. For fillet joints, the maximum dimension of L is 1.25, t_1 or 1.25, t_2, whichever is smaller.





FILLER METAL: Filler metals and fluxes shall be stored and handled so as to avoid damage to them and to the containers in which they are shipped. Those in opened containers shall be protected from deterioration and filler metals which are coated shall be protected from excessive moisture changes. Filler metals and fluxes which show signs of deterioration shall not be used.

SIZE OF WELDING ROD AND TORCH TIP SIZES

Metal Thickness	Tip Orifice Size	Welding Rod Diameter	Oxygen Pressure	Acetylene Pressure	Welding Speed ft./hr.
1/32	74	1/16	5 psig	5 psig	
1/16	69	1/16	5 psig	5 psig	
3/32	64	1/16 or 3/32	5 psig	5 psig	20
1/8	57	3/32 or 1/8	5 psig	5 psig	16
3/16	55	1/8	5 psig	5 psig	14
1/4	52	1/8 or 3/16	5 psig	5 psig	12
5/16	49	1/8 or 3/16	5 psig	5 psig	10
3/8	45	3/16	5 psig	5 psig	9
1/2	42	3/16	5 psig	5 psig	8

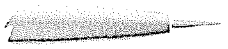
NOTE: This table references the Positive Pressure or Equal Pressure Torch design only.

Metal Thickness	Torch Tip Drill Size	Oxygen Pressure	Acetylene Pressure
1/16" (1.59mm)	56	(15/20 psig working)	5 psig working
1/8" (3.18mm)	53	(20/25 psig working)	5 psig working
1/4" (6.35mm)	48	(25/30 psig working)	5 psig working
½" (12.72mm)	42	(30/35 psig working)	5 psig working

NOTE: Injector type welding tips are design to accommodate greater volumes of fuel to increase the BTU generated

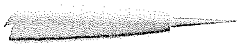
FLAME CHARACTERISTICS

CARBURIZING FLAME



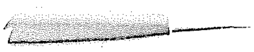
A carburizing flame is a low (BTU) generating flame. This is due to the improper mix of acetylene and oxygen. When lighting the acetylene gas at the tip, the acetylene must be increased until the smoke clears from the flame. At this point you have the correct flow of gas moving through the orifice passage, eliminating a vena contracta effect. Once the oxygen has been introduced, it shall be increased until the second blue cone extends a 1/4" from the end of the inner cone. Brazing and Soldering processes are employed using this torch setting, due in part to the need for a low generation of BTU's being delivered at the joint. Non-ferrous metals such as brass and solder (silver/antomy/bismuth) can not achieve cohesion *due to the dissimilar metal. It must use adhesion.* The carburizing flame is best suited to perform these tasks

NEUTRAL FLAME



A neutral flame is created by, first open the acetylene torch valve and light the gas. Open until the smoke has cleared from the flame. Then open the oxygen torch valve and increase the flow until the outside blue cone becomes one with the inside blue cone. This is the correct balance of acetylene and oxygen to create cohesion without destroying the metal by crystalization and oxidation.

OXIDIZING FLAME



The oxidation flame is created when there is too much oxygen and not enough acetylene. This action creates a flame that is over rich with oxygen and can not be completely burnt off. This allows the excess oxygen to pass through the flame and into the molton puddle causing bubbles to form in the molton metal. After it becomes solid the weld posses porosity (brittle.)

at the weld zone. This allows the operator to weld or heat metals of greater thickness, great hardness, and a need for increased weld speed. Over heating with this type torch can result in crystallization and oxidation of the metal.

NOTE: Tap drill size numbers may vary from one manufacture to another. Please read the specific manufactures chart and tables before attempting a welding task. Improper sizing of an Oxy-acetylene welding tip may result in the weld being either too cold (no penetration) or too hot (crystalized.)

TACK WELDING: As needed

POSITION: All positions

WELDING: The weld shall be made in either one or two passes using the forehand method and using a neutral flame. Only one welder shall be permitted to weld on pipe 6" in diameter or less. The size of a fillet weld is the length of a side of the largest inscribed right triangle and has two equal sides as shown below. An ideal fillet weld is neither concave or convex.

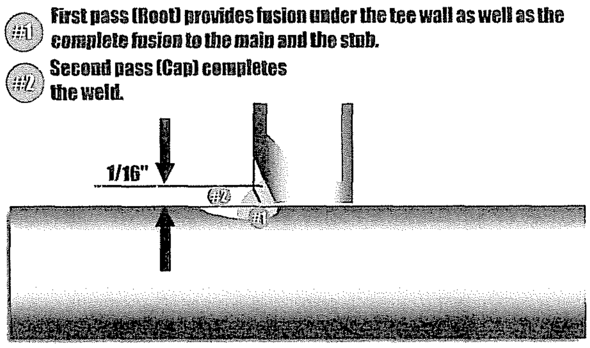
COOLING: There shall be no accelerated cooling of the weld joint until the temperature of the joint is below

600° F.

OXY-ACETYLENE WELDING OF BRANCH CONNECTIONS IN STEEL

This procedure describes the welding of branch connections in API 5L, 5LX-42 and equivalent materials with similar chemical and physical properties such as ASTM A 106, (except cold worked and heat treated materials), in all diameters and wall thicknesses 3/8" and under. The procedure to be followed when making a branch connection is as follows:

JOINT PREPARATION: Generally, all coating shall be removed back at least 9" from the beveled surface prior to welding. However, the thin filmed coatings only need to be removed back a minimum of 1-1/2" beveling may be done by hand using a file or power grinder or a flame-cutting torch. Flame cut surfaces must be smooth and regular. All rust, scale, primer, oil and other material which may be detrimental to the finished weld must be removed from the welding surface. The ratio of wall thickness between the branch and the run shall not exceed 1.5.



SUPPORT: The work shall be supported to avoid strain on the weld during welding and to prevent movement until the weld has cooled to 600° F.

FILLER METAL: Filler metals and fluxes shall be stored and handled so as to avoid damage to them and to the containers in which they are shipped. Those in opened containers shall be protected from deterioration and filler metals which are coated shall be protected from excessive moisture changes. Filler metals and fluxes which show signs of deterioration shall not be used.

NOTE: Tap drill size numbers may vary from one manufacture to another. Please read the specific manufactures chart and tables before attempting a welding task. Improper sizing of an Oxy-acetylene welding tip may result in the weld being either too cold (no penetration) or too hot (crystalized.)

WELDING: The weld shall be made in either one or two passes using the forehand method and using a neutral flame.

COOLING: There shall be no accelerated cooling of the weld joint until the

temperature of the joint is below 600 F.

POSITION: All positions

OXYGEN-ACETYLENE WELDING OF MITER JOINTS

Miter joints are permitted within the following limitations. Miter joints in steel pipe designed to be operated at a pressure of 100 PSIG or less may deflect the pipe no more than 12-1/2° and can be located no closer together than one pipe diameter as measured at the crotch of each joint. A miter joint in steel pipe designed to be operated at a pressure of greater than 100 PSIG may deflect the pipe no more than 3° and can be located no closer together than one pipe diameter as measured at the crotch of each joint.

This procedure describes the welding of mitered joints in API 5L, 5LX-42 and equivalent materials with similar chemical and physical properties such as ASTM A 106, (except cold worked and heat treated materials) in wall thickness 3/8" and under.

JOINT PREPARATION: Generally, all coating shall be removed back at least 9" from the beveled surface prior to welding. However, the thin filmed coatings only need to be removed back a minimum of 1-1/2" all rust, scale, primer, oil and other material which may be detrimental to the finished weld must be removed from the welding surfaces.

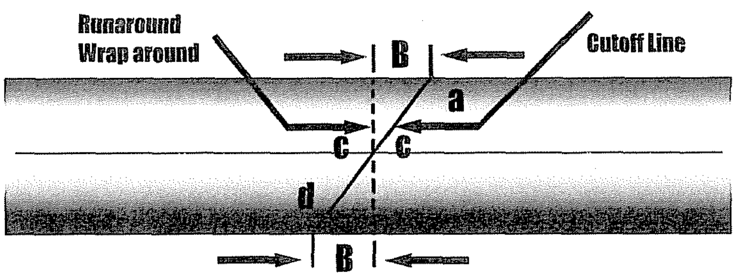
SUPPORT: The pipe shall be supported to avoid strain on the weld during welding and to prevent movement until the weld has cooled to 600° F.

ALIGNMENT: Normally, the welding process causes the miter to draw in approximately 1 ° at the crotch. Therefore, this amount should be compensated for in the initial alignment.

FILLER METAL: Filler metals and fluxes shall be stored and handled so as to avoid damage to them and to the containers in which they are shipped. Those in opened containers shall be protected from deterioration and filler metals which are coated shall be protected from excessive moisture changes. Filler metals and fluxes which

show signs of deterioration shall not be used.

DIRECTIONS FOR LAYING OUT MITER JOINTS WRAPAROUND MARK CUTOFF LINE



The pipe ends shall be cut, beveled and ground smooth to permit complete penetration welds. This figure and following table show how to layout the pipe to make various angles of miters.

1. Quarter the pipe by establishing top, bottom and quarter point lines.
2. Draw the runaround mark on the pipe. The intersection of this line with the quarter point line establishes points C and C1. Point C1 lies directly behind point C.
3. Layout offset distances on top and bottom lines. This establishes points A and D.
4. Draw cut off line by connecting points A, C, C1 and D, C, C1 using a flexible steel tape line or other suitable device as a guide for the soapstone pencil.

Special Note: Offset distance to be laid out on each side of runaround/wraparound mark.

OFFSET "B" FOR MITER JOINTS

NOMINAL PIPE DIAMETER, INCHES							
Deg/Miter	**2"**	**3"**	**4"**	**6"**	**8"**	**10"**	**12"**
4	1/32	1/16	3/32	1/8	5/32	3/16	7/32
6	1/16	3/32	1/8	3/16	7/32	9/32	11/32
8	3/32	1/8	5/32	7/32	5/16	3/8	7/32
10	3/32	5/32	3/16	9/32	3/8	15/32	9/16
12	1/8	3/16	1/4	11/32	15/32	9/16	21/32
14	5/32	7/32	9/32	13/32	17/32	21/32	25/32
16	5/32	1/4	5/16	15/32	19/32	3/4	29/32
18	3/16	9/32	11/32	17/32	11/16	27/32	1
20	7/32	5/16	13/32	19/32	3/4	15/16	1-1/8
22	7/32	11/32	7/16	21/32	27/32	1-1/32	1-1/4
24	1/4	3/8	15/32	23/32	29/32	1-5/32	1-11/32
26	9/32	13/32	17/32	3/4	1	1-1/4	1-15/32
28	9/32	7/16	9/16	13/16	1-1/16	1-11/32	1-19/32
30	5/16	15/32	19/32	7/8	1-5/32	1-7/16	1-23/32
32	11/32	1/2	21/32	15/16	1-1/4	1-17/32	1-13/16
34	3/8	17/32	11/16	1	1-5/16	1-21/32	1-15/16
36	3/8	9/16	23/32	1-1/16	1-13/32	1-3/4	2-1/16
38	13/32	19/32	25/32	1-1/8	1-1/2	1-27/32	2-3/16
40	7/16	5/8	13/16	1-7/32	1-9/16	1-31/32	2-5/16
42	15/32	21/32	7/8	1-9/32	1-21/32	2-1/16	2-7/16
44	15/32	23/32	29/32	1-11/32	1-3/4	2-5/32	2-9/16
45	1/2	23/32	15/16	1-3/8	1-25/32	2-7/32	2-5/8

NOTE: Tap drill size numbers may vary from one manufacture to another. Please read the specific manufactures chart and tables before attempting a welding task. Improper sizing of an Oxy-acetylene welding tip may result in the weld being either too cold (no penetration) or too hot (crystalized.)

TACK WELDING: Tack welds shall be used to maintain proper spacing and alignment. Four welds shall be spaced equally around the circumference. The length of the tack welds is shown below:

3" and smaller 1 inch. long

4-8" and greater 1-1/2 inches long

10-12" and greater 2 inch. long

POSITION: All positions

WELDING: Miter joints shall be welded by the single pass forehand method. The flame shall be neutral.

COOLING: There shall be no accelerated cooling of the weld joint until the temperature of the joint is below 600° F.

MANUAL ARC WELDING OF HORIZONTAL AND 45° FIXED POSITION BUTT JOINTS IN STEEL

This position describes the welding of horizontal or 45° fixed position butt joints in API 5L, 5LX and equivalent materials with similar chemical and physical properties such as ASTM A 106, in all diameters and wall thicknesses, The procedure to be followed when making a horizontal or 45° fixed position butt weld is as follows:

JOINT PREPARATION: Generally, all coating shall be removed back at least 9" from the beveled surface prior to welding, However, the thin filmed coatings only need to be removed back a minimum of 1-1/2" all rust, scale, primer, oil and other material which may be detrimental to the finished weld must be removed from the welding surfaces, The following joint design is preferred; however, a 37-1/2° bevel is permissible.

TIP NUMBERS

Wall Thickness	Tip number Victor	Tip Number Oxweld	Travel Speed (IPM)	Welding Rod Size
5/32 or less	#3-#4	#9-#15	1-2	1/8
3/16	#3-#4	#9-#15	1-2	1/8-5/32
1/4	#3-#4	#9-#15	1-2	5/32-3/16
5/16	#4	#15-#30	1-2	3/16
3/8	#4	#15-#30	1-2	3/16-1/4

SHADED LENSES

Process	Metal Thickness		Shade Number
	Inches	mm	
Gas Welding			
*Light	Under 1/8"	Under 3.2	4 or 5
*Medium	1/8" to ½"	3.2 to 12.7	5 or 6
*Heavy	Over ½"	Over 12.7	6 or 8
Oxygen Cuttting			
*Light	Under 1"	Under 25	3 or 4
*Medium	1 to 6	25 to 150	4 or 5
*Heavy	Over 6	Over 150	5 or 6

OXY-ACETYLENE SAFETY INFORMATION

OXY-ACETYLENE WELDING

INTRODUCTION

Any process that employs fusion (cohesion) by joining two separate pieces of metals together is a welding process. Any process that performs a joining of two pieces of metal either alike or unalike employing (adhesion) is not a welding process. An example of the adhesion process would be (Brazing/Soldering).

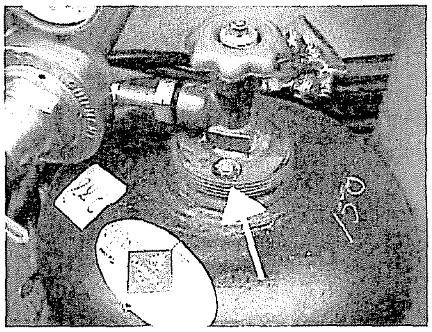
OXY-ACETYLENE WELDING EQUIPMENT

ACETYLENE CYLINDER

The Acetylene cylinder is constructed of 1/4" armor plated steel. The Acetylene cylinder houses approximately 250-300 psi of Acetylene. The cylinder has four purifiers housed inside the cylinder which mix with the Acetylene gas. The four purifiers are as follows:

1. Fuller's Earth
2. Pith of Cornstalks
3. Lime Silica
4. Acetone (vapor state)

These purifiers provide a vital function in the Oxy-acetylene welding process. It provides for safe operation and safety for the welder and the equipment. Acetylene pressure in the pure state is unstable at pressure 15 psi and above. Spontaneous combustion can occur if the conditions are right. Why and how can this condition develop? Lets take a look at the Acetylene gas to understand how this condition can occur. When Acetylene gas in the pure state is compressed at 15 psi and greater the gas molecules start bumping into each other which creates friction, which in turn starts to heat up the Acetylene gas. The greater the pressure of Acetylene in the pure state the quicker the generation of heat inside the cylinder. No explosion will occur because of the lack of an atmosphere (oxygen) inside the cylinder. To eliminate this condition from occurring, the purifiers are added to the Acetylene gas to act as a block between the gas molecules which prevents the molecules from bumping one another creating friction and heating up. Without the purifiers mixed in with the acetylene gas the temperature in the cylinder would rise to a dangerous level. But we can't always depend on the purifiers to perform the entire safety function. The purifiers are subject to changes in temperature in and around it's surrounding environment. Take for example, the cylinder is stored in a storage area where the temperature is high and it is removed to an environment where the temperature is extremely low. The rapid change in temperature will cause the Acetone in the cylinder to condense which in turn will settle the other purifiers which when together form a dust type of substance. This action is similar to a summer afternoon shower, where warm air comes together with cool air to create rain. The rain settles all the dust in the air which usually falls on your freshly washed car. The Acetone when it condensates performs the same act, settling the purifiers.



Fuse Plugs (Melting Point 212°F)

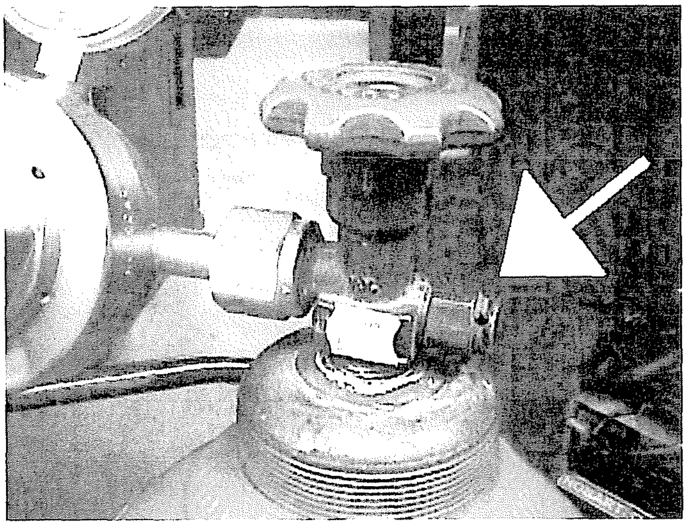
When the purifiers have settled, the Acetylene gas will start to heat up through friction. The Acetylene Cylinder possesses a second safety feature, (Fuse Plugs). The Fuse plugs are located on the top and bottom of the cylinder which are housed inside the neck shroud of the cylinder. They are bolt like objects with special alloy centers. The alloy centers are high in (Bismuth) which is used in fire safety devices. An example of a fire safety device which employs Bismuth would be a sprinkler head. It's metal band that keeps the water valve closed and upon the application of heat would melt the metal band and allow the water valve to open up to extinguish any fire. This metal band is of the same material as the Fuse Plug. It is high in Bismuth. When the temperature inside the cylinder reaches 212 degrees fahrenheit, the hot Acetylene gas will melt the Fuse Plug centers out, which vents off the cylinder to the atmosphere rendering the cylinder harmless from expansion or explosion. The venting of the Acetylene gas shall be avoided if at all possible. The high pressure in the cylinder can cause serious injury. Also the venting Acetylene gas will ignite when in contact with the atmosphere. If the venting occurs in an enclosure, evacuate the enclosure immediately, for the Acetylene gas is extremely heavy and will settle to the ground. When upon the ground, the Acetylene can be ignited if falling embers reach the ground. This will result in an explosion.

NOTE: Never turn an Acetylene cylinder valve on all the way. The valve should never be turn on more than half a turn. This is done to ensure rapid closing of the valve in case of an emergency.

<u>OXYGEN CYLINDER</u>

The Oxygen cylinder is constructed of 1/4" armor plated steel. The Oxygen cylinder houses approximately 2500-3000 psi of oxygen. The Oxygen cylinder has one solid forged brass valve. This valve is called the (Double Seating Valve). It performs two functions. The first seat is called the lower seat which seats the pressure off from the regulator and prevents build up under the diaphragm. This condition can occur if the regulator seat or orifice has been damaged which would allow bleed-by and build up. If the valve is not turn off completely the lower seat can not perform it's function. The upper seat prevents the high pressure from bleeding through the core of the valve. The upper seat, seats off the core of the valve. The valve most be turned on all the way to allow the upper seat to perform it's function of seating.

The Oxygen cylinder valve has a safety feature. The solid forged brass valve has a (Safety Disc) incorporated into the valve. The Safety Disc will rupture at 5700 psi and relieve it's stored pressure off at 150 psi, safely venting off the high pressure. No cylinder can vent off the rupture pressure of 5700 psi, it would become a rocket. This rocket has the potential of death and destruction, thus the venting of the cylinder at 150 psi.

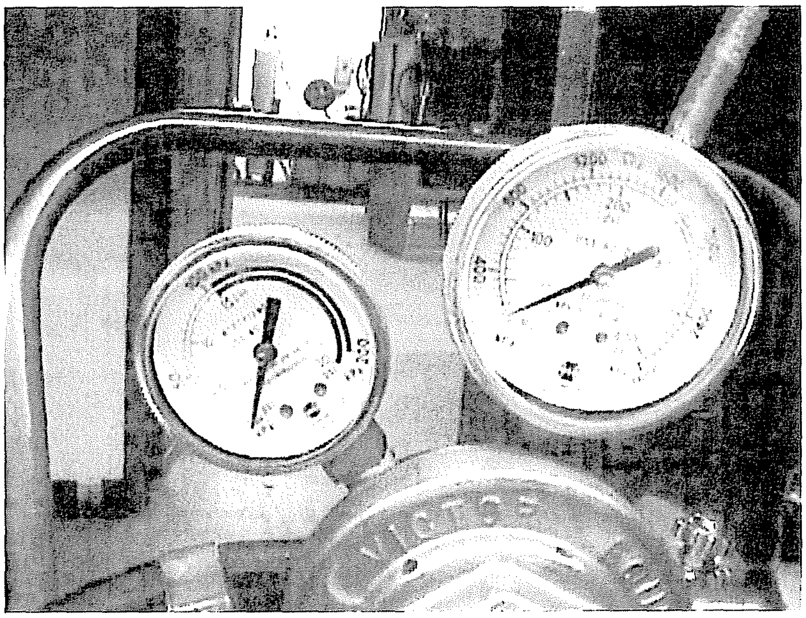


Rupture Disc (Ruptures @ 5700 psig)

OXY-ACETYLENE REGULATORS

The regulators used in the Oxy-acetylene process are of two types. One is the (Single Stage Regulator) and the second is the (Two Stage Regulator). These two regulators are the primary regulators used in the Oxy-acetylene process. The Single stage regulator is of a very simple design. It has one diaphragm, one chamber and one adjustment spring. This type is primarily used for single application where one person is using the equipment. The Two stage regulator is a complex designed regulator. It has three separate delivery pressures, two diaphragms, two chambers and three adjustment springs, two of which are manually adjustable. The back adjustment spring is for intermediate pressure adjustment, this pressure can be re-adjusted to elevate the pressure delivery to the working pressure chamber which is housed under the working pressure diaphragm. This design allows for more than one torch to be hooked up to the regulator. The Two Stage regulator allows for constant flow under all conditions, whether using single application or multiple application.

NOTE: The intermediate adjustment spring should never be adjusted. It is preset for a specific delivery and should not be elevated. Adjustment of the intermediate spring would only be required if it were used with the (Lance Cutting Process).



Acetylene Regulator (Never exceed 15 psig/explosion may occur)

GAUGES

The gauges are spring type gauges and should be handled with care to ensure smooth operation and welder safety. There are two types of gauges used with the regulator. They are the (Cylinder Pressure Gauge) and the (Working Pressure Gauge). The Cylinder Pressure Gauge is located on the inlet side of the regulator and shows the amount of pressure in the cylinder. The Working Pressure Gauge is located on the outlet side of the regulator and indicates the pressure at which we are using. The Acetylene pressure gauges are different from the Oxygen gauges. Their construction is identical, the only difference is the indicator face. The numbers, values and increments differ one from the other.

HOSES

The Oxy-acetylene process employs to types of hoses. The Acetylene hose and the Oxygen hose. The Acetylene hose will always be red in color. The Oxygen hose can be either black or green. The two hoses are identical in their construction. The hoses have three layers. (1) the first layer is a soft and flexible inner rubber. (2) the second layer is a rubber woven fabric, this layer provides the strength for the soft inner layer. (3) the third layer is a hard vulcanized rubber, this layer is wear resistant. If the hose becomes worn or cut, replace the hose immediately, do not repair it.

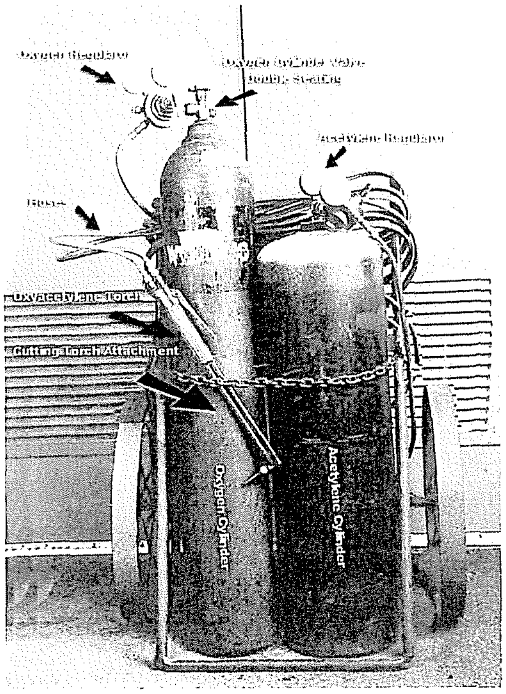
TORCH

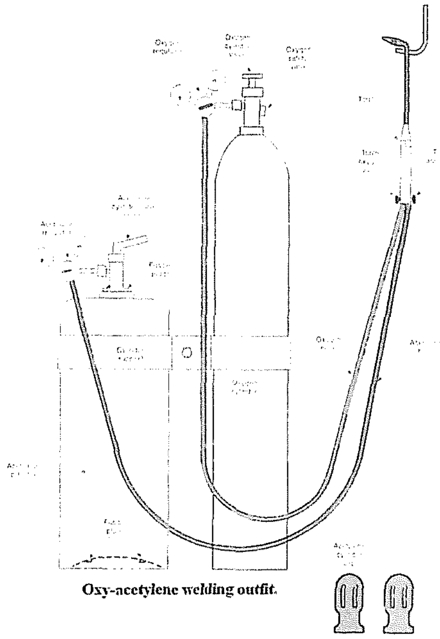
There are two types of torches, they are the (Equal Pressure Torch) and the (Injector Torch). The Equal Pressure Torch is of a simple design, it is constructed where as the oxygen passage in the torch enters directly into the venturi with no obstruction. This action allows the oxygen pressure to create a jet action effect pulling the acetylene with it. The acetylene passage is constructed together with the mixing chamber of the torch and creates an obstruction. The obstruction is corrected due to the jet action effect of the oxygen flow. The Equal Pressure Torch uses a working oxygen pressure of 5 psi and an acetylene working pressure of 5 psi, thus earning the name Equal Pressure Torch. The Injector Torch is of a complex design, it uses an oxygen working pressure of 15 to 35 psi and a acetylene working pressure of 5 psi. The internal construction has an acetylene passage and an oxygen passage. The oxygen passage is a very small tube that is positioned inside the acetylene passage tube. The acetylene tube is much larger than the oxygen tube. The difference in the size of passages and the difference in the working pressures allow this type torch to be used for larger applications and high production areas. The Injector Torch's oxygen passage being a very small tube needs the higher working pressure to perform the complete combustion of the acetylene. The higher pressure 15 to 35 psi compensates for a lack of volume in the oxygen passage. The acetylene passage works with a much lower working pressure, which is 5 psi. Due to the lower working pressure of 5 psi, the acetylene passage requires a greater volume in its passage, which allows the oxygen to create a jet action effect pulling the lower acetylene pressure with it, performing complete combustion.

NOTE: The Equal Pressure Torch and the Injector Torch valves (acetylene and oxygen) seat off against soft neoprene rubber. Damage can occur to the soft seats if the valves are closed with an excessive amount of pressure. If the seats are damage by cutting into the seats, the seats at this point will not be able to stop the bleed by, which allows acetylene or oxygen to escape which can reduce the amount of available fuel. This condition can also cause potential safety hazards.

NOTE: The connecting fittings on the oxygen side of the set-up are right handed threads (clock-wise to tighten). The connecting fittings on the acetylene side of the set-up are left handed threads (counter clock-wise to tighten). The left handed threads are identified by notches on the connecting fittings.

NOTE: A torch should never be lit by an open flame such as a (lighter, match, an arc or off of a hot weld). The ignition from these sources will create ignition out in the flame which the ignition will rush back to the torch tip and could cause a dangerous flashback into the mixing chamber of the torch.





Oxy-acetylene Outfit (pictural)	Oxy-acetylene Outfit (schematic)

SAFETY AND SAFETY EQUIPMENT

SAFETY EQUIPMENT

When Arc Welding, precaution must be taken to ensure safety to yourself and others around you. These precautions are the responsibility of the welder performing the task, to ensure safety for all persons involved in the process.

Lets look at protective clothing for the welder:

1. Shirts should be of 100% cotton with flaps covering the pockets of the shirt and long sleeves. Molten metal can fall into open pockets causing fire and injury.

2. Pants should be of a heavy work cotton or denim. There shall never be cuffs on the pants. The cuffs will catch flying sparks and globules of molten metal causing the pants to catch fire.

3. Shoes must be leather, either shoes or boots. There shall not be any foam-rubber inlay in the tops of the foot wear. The foam-rubber when in contact with molten metal, melts the foam-rubber which burns deep in the skin causing serious damage. Socks are to be cotton. The clothing shall never be Rayon or polyester. Clothing should always be cotton.

4. Jewelry should be removed while welding, due to the potential of shock and burns associated with the intense current, heat and light of the Arc Welder.

5. If the welder wears Glasses, care must be taken to prevent the flying sparks from sticking to and Burning into the glass. A welder can destroy a pair of glasses by not taking precautions to protect the lenses.

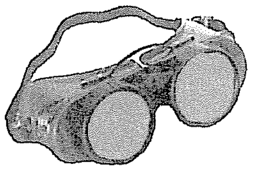
Lets look at protective equipment for the welder:

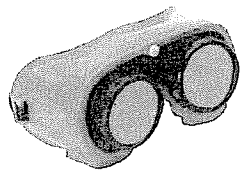
1. The ***Oxy-acetylene Goggles*** is one of the most important and vital pieces of safety equipment the welder has for protection of the eyes. The goggles usually have a #5 shade lens installed in the goggles for protection of the eyes. The shade for Oxy-acetylene Welding Process can be not less than a #5 shade lens. The skin must be protected as well as the eyes. The skin can receive serious burns if caution is not taken to protect the skin.

2. ***Leathers*** are the welders protection for the body. Leathers come in full jackets, sleeves, aprons and chaps. The full jackets protect the welders upper body, arms, shoulders and back. The full jacket extends down to the hips for full coverage. The sleeves protect the arms and upper chest area and can be worn in conjunction with the apron which attaches to the sleeves to form a full jacket and can be removed easily if the need arises. The chaps are full leggings which strap around the back of the legs to cover legs and lower body. The chaps also have upper body protection as well. Attached to the leggings is an apron fully attached to form protection for the upper chest area to the toes. The leathers protect against flying sparks, molten globules, ultraviolet rays and hot metal.

3. ***Gloves*** are the welders protection for the hands and wrist area. The Gloves will be the Gauntlet type which cover the hands and the wrist up half way of the forearm. The gloves will be fully leather with no cotton backing on the gloves. Short wrist length gloves should not be worn, because fallen sparks and hot metal will fall on the arms and hands causing burns.

NOTE: If gloves become worn or start to develop holes, replace the gloves and protect yourself against injury.
THINK SAFETY NOT INCONVIENCE "REPLACE THOSE WORN GLOVES".





Two types of 50 mm (2") round welding goggles. Both will fit over prescription glasses.

NOTE: For welding, recommended shade lens would be a 5 to 6 shade.
NOTE: For cutting, recommended shade lens would be a 4 to 5 shade.

Gautlet type leather gloves are essential safety gear for all welding.

Leather welding jackets provide protection gear for all welding. Such as flames, heat, sparks and molton metal.

SELECTOR CHART

Selection Chart for Eye and Face Protectors for Use in Industry and Schools

1

Goggles, flexible fitting, regular ventilation

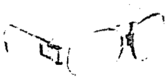
2

Goggles, flexible fitting, hooded ventilation

3

Goggles cushioned fitting rigid body

4



Spectacles

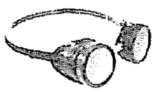
5

Spectacles, eyecup type eyshields

6

Spectacles semi-flat-fold sideshields

7



Welding goggles, eyecup type, tinted lenses

7A

Chipping goggles, eyecup type, tinted lenses

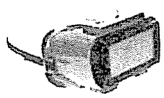
8

Welding goggles coverspec type, tinted lenses

8A

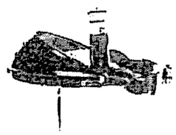
Chipping goggles, coverspec type, clear safety lenses

9



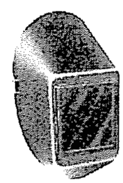
Welding goggles coverspec type, tinted plate lens

10



Face shield, plastic or mesh window (see caution note)

11



Welding helmet

Non-sideshield spectacles are available for limited hazard use requiring only frontal protection

Applications

Operation	Hazards	Protectors
Acetylene-Burning Acetylene-Cutting Acetylene-Welding	Sparks, Harmful Rays Molten Metal, Flying Particles	7,8,9
Chemical Handling	Splash, Acid Burns, Fumes	2 (for severe exposure add 10)
Chipping	Flying Particles	1,2,4,5,6,7A,8A
Electric (Arc) Welding	Sparks, Intense Rays, Molten Metal	11 (in combination with 4,5,6 in tinted lenses advisable)
Furnace Operations	Glare, Heat, Molten Metal	7,8,9 (for severe exposure add 10)
Grinding-Light	Flying Particles	1,3,5,6 (for severe exposure add 10)
Grinding-Heavy	Flying Particles	1,3,7A,8A (for severe exposure add 10)
Laboratory	Chemical Splash, Glass Breakage	2 (10 when in combination wih 5,6)
Machining	Flying Particles	1,3,5,6 (for severe exposure add 10)
Molten Metals	Heat, Glare, Sparks, Splash	7,8 (10 in combination with 5,6 in tinted lenses)
Spot Welding	Flying Particles, Sparks	1,3,4,5,6 (tinted lenses advisable; for wevere exposure add 10)

CAUTION:
Face shields alone do not provide adequate protection. Plastic lenses are advised for protection against molten metal splash. Contact lenses, of themselves, do not provide eye protection in the industrial sense and shall not be worn in a hazardous environment without appropriate covering safety eyewear.

OPERATION OF OXY-ACETYLENE SYSTEM

Start-up Procedures:

1.Observe the gauges to ensure there is no pressure registering on the gauges.

2.Check "Regulator Adjustment Screws" to ensure no tension on the regulator adjustment spring, located in the regulator bonnet.

3.Make sure the torch valves (acetylene and oxygen) are both off before adjustment.

4.Open the oxygen cylinder valve first by cracking the valve open slowly. Then as soon as the full cylinder pressure reads out on the "Cylinder Pressure Gauge," continue to open the valve all-the-way until it stops and then give it a light twist to seat the valve.

5.Take the regulator adjustment screw in hand and rotate clockwise until desired pressure reads out on the "Working Pressure Gauge."

6.Open the oxygen torch valve and check the differential drop on the gauge to ensure desired working pressure on the gauge. Close torch valve.

7.Open the acetylene cylinder valve by cracking the valve open "Slowly"! Then as soon as the full cylinder pressure reads out on the cylinder pressure gauge, continue to open the valve 1/4 to ½ a turn.

8.Take the regulator adjustment screw in hand and rotate clockwise until desired pressure reads out on the working pressure gauge.

9.Open the acetylene torch valve and check the differential drop on the gauge to ensure desired working pressure on the gauge. Close torch valve.

10. Slightly open the acetylene torch valve approximately an 1/8 of a turn.

11. Light the acetylene gas with the spark lighter. NOTE: Get as close to the tip as possible with the spark lighter.

12. Open the acetylene torch valve until the carbon smoke clears from the burning gas. NOTE: This is the acetylene adjustment.

13. Open the oxygen torch valve and mix the oxygen at a slow rate, never at a fast rate. NOTE: You will achieve the 3 flames for oxy-acetylene applications.

Shut-down Procedures:

14. Close the acetylene torch valve first and extinguish the burning fuel.

15. Close the oxygen torch valve.

16. Close the acetylene cylinder valve.

17. Open the acetylene torch valve and bleed the system down until the gauge (acetylene) reads zero.

18. Close the Acetylene torch valve.

19. Back out the regulator adjustment screw until there is no tension on the spring.

20. Close the oxygen cylinder valve.

21. Open the oxygen torch valve and bleed the system down until the gauge (oxygen) reads zero.

22. Close the oxygen torch valve.

23. Back out the regulator adjustment screw until there is no tension on the spring.

24. Open the acetylene torch valve and check to ensure there is no lingering acetylene in the hoses.

25. Open the oxygen torch valve and check to ensure there is no lingering oxygen in the hoses.

NOTE: These are the steps in starting up and shutting down of the oxy-acetylene system properly. There is no other way, ***PERIOD! NO MATTER HOW LONG YOU HAVE BEEN WELDING!***

OXY-ACETYLENE CUTTING AND APPLICATIONS

CUTTING EQUIPMENT

Whether the torch is Equal Pressure or Injector, the attachment of the Cutting Torch converts the system over to an injector system. The injector system requires an imbalance in the pressures used with this type system. The pressures used with the cutting torch are as follows:

Acetylene pressure = 5 psi (Never exceed 5 psi)

Oxygen pressure = 15 to 45 psi

The cutting torch can be viewed at the end of this chapter and a cut-away view of the internal workings of the torch. The cutting torch has 5 valves on the torch assembly. They are (1) Acetylene Torch Valve (2) Oxygen Torch Valve (3) Oxygen Cutting Valve with Oxygen Cutting Lever attachment (4) Flo-trol Check Valve and (5) Oxygen Pre-Heat Valve. Of the 5 valves on the torch there are only 4 adjustable valves. The 4 adjustable valves are (1) Acetylene Torch Valve (2) Oxygen Torch Valve (3) Oxygen Cutting Valve and the (4) Pre-Heat Valve. The Flo-Trol Check Valve is a one way check valve, which allows the pressure to travel in only one direction and that is from the supply side of the system.

The tip has an arrangement of small orifices surrounding one larger single orifice. The smaller orifices are known as (Pre-Heat Orifices). They Mix the Acetylene and Oxygen to create a **NEUTRAL FLAME** for cutting. The larger center orifice is known as the **CENTER JET ORIFICE**. The center jet orifice only delivers higher pressure oxygen which blows the molten metal away performing the cut.

CUTTING APPLICATION

There are many critical things that must be right in order to perform a correct cut. Not ever welder can make a quality cut and this is due in part to a misconception that the cutting process is easy and **"I CAN WELD"**, thus the attitude that I don't need the training in how to perform a quality cut. This type individual usually has no concept of metal compositions or the metals reaction to the application to heat. This usually equates to damaged metal which the welder will usually end up welding and floating damaged metal into the weld, creating a poor weld.

The proper steps in making a quality and cosmetic cut are as follows:

STEP #1

To adjust the torch correctly for a cut, we must make sure the working pressures are correctly set for the application. The pressure ranges for cutting and how they match up to the diameter metal are as follows:

NOTE: Acetylene pressure will always be set at 5 psi, no more, no less for any cutting or welding using the Oxy-acetylene process.

OXYGEN PRESSURE RANGES FOR METAL DIAMETERS

1/16"	**1/8"**	**1/4"**	**3/8"**	**1/2"**	**5/8"**	**3/4"**
15 PSI	20 PSI	25 PSI	30 PSI	35 PSI	40 PSI	45 PSI

NOTE: Any diameter stock 3/4" (.75") or greater will use 45 psi oxygen pressure. Never exceed this value, the excess pressure will cause the cut metal to become crystallized due to the excessive oxygen being delivered to the metal. The excessive oxygen pressure will also cause such a violent reaction that the molten metal can be blown back into the welders face causing injury. Also this action will destroy the quality of the cut. Thermal transfer of crystalline effect in the lower region of the cut.

Whatever the thickness of the stock, always match the correct pressure to perform the cut.

STEP # 2

Match up the correct pressures for the cut. Open the oxygen torch valve on the torch all the way. This will give us the full available pressure to the (Oxygen Cutting Valve) and the (Oxygen Pre-Heat Valve). Next open the (Acetylene Torch Valve) about an 1/8 of a turn and light the acetylene off using the spark lighter. Open the acetylene valve to the lit acetylene flame until the carbon smoke in the flame becomes transparent. This is your adjustment for the acetylene pre-heat orifices (rated.)

STEP #3

Next open the (Oxygen Pre-Heat Valve) until you achieve a neutral pre-heat flame.

After you have a neutral pre-heat flame, depress the (Oxygen Cutting Lever) down all the way. By doing this we are diverting oxygen pressure that was going through the oxygen pre-heat passage which is much smaller than the cutting jet orifice passage. With this pressure loss in the oxygen pre-heat passage it will cause the pre-heat flame to become carburizing. To get the flame back to a neutral flame we must readjust the oxygen pressure. Open the oxygen pre-heat valve more to compensate for the loss of oxygen. This readjustment will bring the cutting flame back to a neutral flame for cutting.

NOTE: This readjustment will cause the pre-heat flame to become oxidizing. This means we can not start the cut in molten metal, for if we did the metal would become crystalized due to the flame being an oxidizing flame (excess oxygen in the flame and transferred into the metal).

STEP # 4

The cut should be started if possible at the metals thinnest edge. This approach makes starting the cut easy without any slag buildup when the cut is initiated. Initiate the cut with the torch in the 90 degree position by allowing an 1/8" distance between the end of the flame and the surface of the metal. Bring the metal to the **PLASTIC STATE**, this means the metal is between the solid state and the molten state. The metal will be bright orange and start to glisten. At this point start depressing the oxygen cutting lever easy until the cut is completely through the entire stock. Once you are through the stock, change the angle from a 90 degree position to what ever the recommended position is for the diameter of the stock. There are basically 3 positions for cutting various diameter mild steel metal. See the Table below:

CUTTING ANGLES FOR DIAMETER MILD STEEL

15 to 20 Degree	45 Degree	90 Degree
1/16 - 1/8"	1/4 - 3/8"	1/2" and Greater

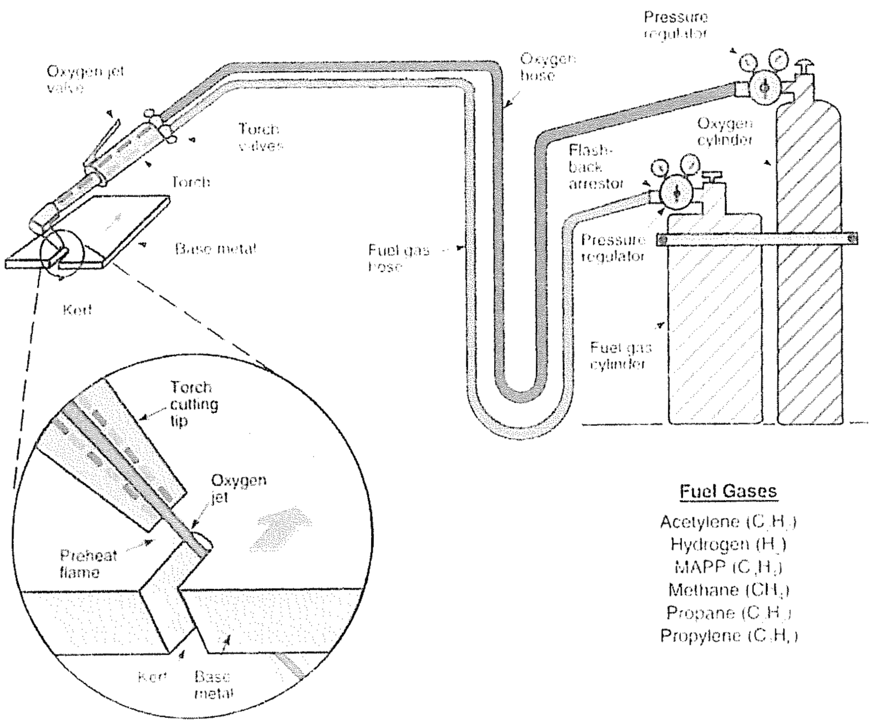
NOTE: Any angle other than these shown above will be incorrect and the cuts performed will not reflect **QUALITY or COSMETICS**.

Once the angle is correct, make sure we are square to the surface of the metal an initiate your travel speed. Travel speeds can be too slow or too fast, creating an inconsistent cut. If the cut is too slow, we can develop slag and weld-back in the cut. If the cut is too fast, then we are at risk of actually running out of the cut and will be on cold stock surface not performing a cut.

Make sure there is a small molten section on the leading edge of the cut that continues to stay in this state. This ensures the travel speed is correct and the **"KERF"** will reflect the quality of the cut. A cut section should fall off or separate on its own without having to **HAMMER** it apart.

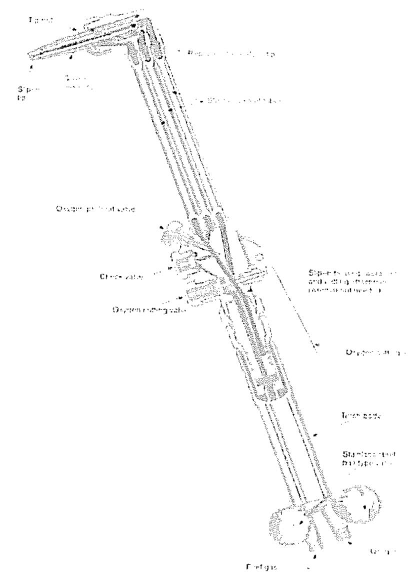
NOTE: If a cut is stopped in the middle of the cut, never initiate the cut from the stopping point. This will when we depress the oxygen cutting lever create a slag deposit and a undercutting in the kerf of the metal that causes a lack of quality in the cut.

Always drop back 1" to 1.5" in the previous cut area and re-start the cut by glazing the section of the cut metal that will not be used. When you have achieved the glazing, travel slow along this edge until you reach the point where the cut was stopped. Once you reach this area, drop down level with the original plain of the travel and continue the cut



The flame heats the base metal to a dull cherry red, the lever on the torch is depressed. This allows a jet of oxygen to rush out of an orifice. The oxygen jet quickly oxidizes the heated base metal and blows it away. This removal of metal leaves a kerf (cut) in the base metal.

until finished. This will show no stopping or starting in the kerf of the cut.



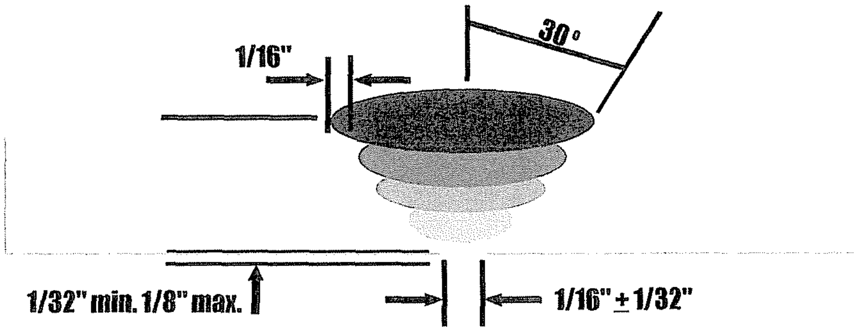
Cut away view of the cutting torch.

SHIELDED METAL ARC WELDING (SMAW)
OF HORIZONTAL AND 45° FIXED POSITION BUTT JOINTS

This position describes the welding of horizontal or 45° fixed position butt joints in API 5L, 5LX and equivalent materials with similar chemical and physical properties such as ASTM A106, in all diameters and wall thickness.

The procedure is to be followed when making a horizontal or 45° fixed position butt weld is as follows:

JOINT PREPARATION: Generally, all coating shall be removed back at least 9" from the beveled surface prior to welding. However, the thin filmed coatings only need to be removed back a minimum of 1-1/2" all rust, scale, primer, oil and other material which may be detrimental to the finished weld must be removed from the welding surfaces.



SUPPORT: The pipe shall be supported so that there is no strain on the stringer bead and so the pipe will be supported until the weld is completed.

ALIGNMENT: An approved type of line-up clamp shall be used to center the joint and to minimize high-low, offset resulting from out of roundness shall not exceed 3/64" for wall thickness 1/4" and under, and 3/32" for wall thickness greater than 1/4", small variations between the internal surfaces may be swage cold. Such swaging shall not extend at least one inch from the ends, Heat may be applied, provided the pipe has not been cold worked in manufacture. If a difference in wall thickness results in an internal or external offset exceeding 3/64" for wall thickness 1/4" and under, and 3/32" for wall thickness greater than 1/4., the thicker section shall be tapered (1 on 4) to meet the thinner section, Back-up rings are prohibited.

FILLER METAL: Welding electrodes shall be kept dry and protected from any mechanical damage or deterioration. Filler metals and fluxes shall be stored and handled so as to avoid damage to them and to the containers in which they are shipped. Those in opened containers shall be protected from deterioration and filler metals which are coated shall be protected from excessive moisture changes. Electrodes which show signs of deterioration or suspected to be defective shall not be used.

When welding API 5L pipe, either E6010, E6011 or E7010 electrodes may be used for all beads. An alternate method is E6010, E6011 electrodes for the stringer and E7010 used for all cover beads. When welding API 5LX52, API 5LX60 or API 5LX65, (high yield strength pipe) the E7010 or E8010 electrodes may be used for all passes. An alternate method is E 6010+ electrode for the stringer and all cover beads with the E7010 or E8010 electrodes.

ELECTRODE SIZES

WALL THICKNESS	ROOT	2^{ND} PASS	3^{RD} PASS	4^{TH} PASS	COVER PASS
.154	3/32	3/32-1/8			1/8
.187.	3/32-1/8	1/8	1/8		1/8-5/32
.219	1/8	1/8-5/32	1/8-5/32	1/8-5/32	5/32
.250	1/8-5/32	1/8-5/32	5/32	5/32-3/16	5/32-3/16
.250-.312	5/32	5/32	5/32	5/32-3/16	3/16
.375-.625	5/32	5/32	5/32-3/16	5/32-3/16	3/16

TACK WELDING: If tack welding is used, the tack welds are to be considered as part of the stringer bead. They shall be 3" long and spaced 90° apart. If a tack or any part of the stringer bead, cracks or breaks, the weld shall be cut out and the pipe and/or fitting ends re-beveled. Tacks of excessive thickness shall be cut down with a power grinder, diamond point or round nose chisel. The use of an oxy-acetylene cutting torch or a welding electrode will not be permitted for removing excessive metal.

POSITION: In the horizontal fixed position the pipe shall be placed with its axis in the horizontal plane with the welding groove in the vertical plane. In the 45° fixed position the pipe shall be placed with its axis at 45° from the horizontal. The pipe shall remain in these fixed positions during welding.

WELDING: The stringer, filler and stripped beads shall be deposited by the downhill welding method. The cover pass may be deposited uphill or downhill method depending upon appearance requirements for exposed piping.

The stringer bead shall be deposited so as to completely fuse the abutting edges of the lands and beveled parts of the joint, There shall be complete penetration with a minimum inside buildup of 1/32" and a maximum buildup of 1/8", When external line-up clamps are used, the clamp shall be held in place until at least 50% of the circumference is welded in increments spaced equally around the pipe.

The maximum time interval between the completion of the stringer bead and the beginning of the hot pass shall not exceed five minutes.

Two successive passes shall not be started at the same point. Each pass shall be completed before the next pass is started. A stripper or short bead shall be used to build up low areas, all slag, knots of filler metal, and similar surfaces defects shall be removed with a power grinder, diamond point or round nose chisel.

The cover bead shall be deposited by a weaving motion.

COOLING: There shall be no accelerated cooling of the weld joint until the temperature of the joint is below 600° F.

ELECTRICAL CHARACTERISTICS AND TRAVEL SPEED

Electrode Size	Amperage Range	Voltage Range	Inches per Minute	Weave Bead IPM
3/32"	60-100 amps	20-26 volts	12-20" per minute	4"-10"
1/8"	100-160 amps	20-26 volts	10-18" per minute	4"-10"
5/32"	120-220 amps	20-26 volts	10-18" per minute	4"-10"
3/16"	120-220 amps	20-26 volts	8-16" per minute	2"-8"

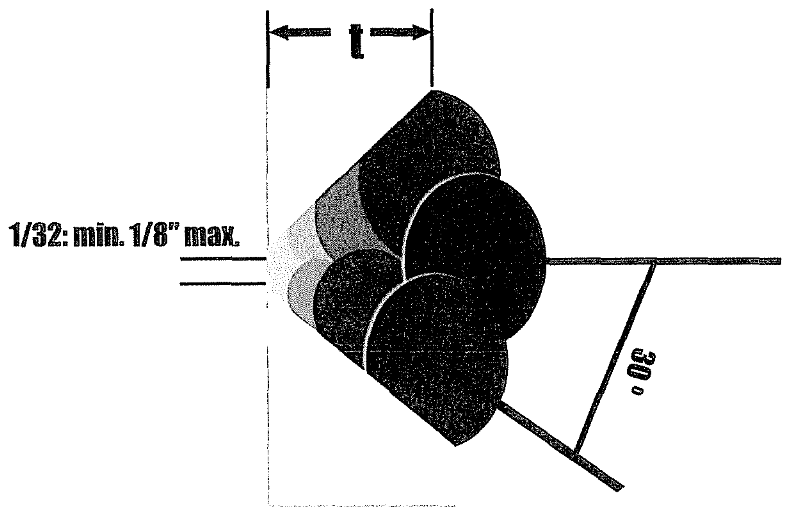
MINIMUM NUMBER OF BEADS: As a minimum, one welding bead shall be deposited for each 3/32" of wall thickness when the pipe wall is .312"- or less. When the pipe wall thickness is greater than .312", one welding bead shall be deposited for each 1/16" of wall thickness.

MANUAL ARC WELDING OF VERTICAL BUTT JOINTS IN STEEL

This position describes the welding of vertical butt joints in API 5L, 5L.X and equivalent materials with similar chemical and physical properties such as ASTM A 106, in all diameters and wall thicknesses, The procedure to be followed when making a vertical butt weld is as follows:

JOINT PREPARATION: Generally, all coating shall be removed back at least 9" from the beveled surface prior to welding. However, the thin filmed coatings only need to be removed back a minimum of 1-1/2" all rust, scale, primer, oil and other material which may be detrimental to the finished weld must be removed from the welding surfaces. The following joint design is preferred; however, a 37-1/2° bevel is permissible.

VERTICAL BUTT WELD JOINT



SUPPORT: The pipe shall be supported so that there is no strain on the stringer bead and so the pipe will be supported until the weld is completed.

ALIGNMENT: An approved type of line-up clamp shall be used to center the joint and to minimize high-low, offset resulting from out of roundness shall not exceed 3/64" for wall thickness 1/4" and under, and 3/32" for wall thickness greater than 1/4". Small variations between the internal surfaces may be swage cold. Such swaging shall not extend at least one inch from the ends. Heat may be applied, provided the pipe has not been cold worked in manufacture. If a difference in wall thickness results in an internal or external offset exceeding 3/64" for wall thickness 1/4" and under, and 3/32" for wall thickness greater than 1/4", the thicker section shall be tapered (1 on 4) to meet the thinner section, where internal tapering is not feasible welding is permissible to correct for offset if the joint is readily accessible and the offset dimension does not exceed 1/2" T (T = thinner section.) Back-up rings are prohibited.

FILLER METAL: Welding electrodes shall be kept dry and protected from any mechanical damage or deterioration. Filler metals and fluxes shall be stored and handled so as to avoid damage to them and to the containers in which they are shipped. Those in opened containers shall be protected from deterioration and filler metals which are coated shall be protected from excessive moisture changes.

Electrodes which show signs of deterioration or suspected to be defective shall not be used. When welding API SL pipe, either E 6010 or E 7010 electrodes may be used for all beads. An alternate method is E 6010 electrodes for the stringer and E 7010 used for all cover beads. When welding API SLXS2, API SLX60 or API SLX6S, (high yield strength pipe) the E 7010 or E 8010 electrodes may be used for all passes. An alternate method is E 6010+ electrode for the stringer and all cover beads with the E 7010 or E 8010 electrodes.

SIZE OF ELECTRODE: The electrode sizes listed in the following tables are the maximum diameter electrode that can be used.

BEAD METHOD ELECTRODE SIZE

Stringer Drag 5/32"

All fillers Bead 5/32".

Cover Lace 5/32".

TACK WELDING: If tack welding is used, the tack welds are to be considered as part of the stringer bead. They shall be 3" long and spaced 90° apart. If a tack or any part of the stringer bead. cracks or breaks, the weld shall be cut out and the pipe and/or fitting ends re-beveled. Tacks of excessive thickness shall be cut down with a power grinder, diamond point or round nose chisel. The use of an oxy-acetylene cutting torch or a welding electrode will not be permitted for removing excessive metal.

POSITION: The pipe shall be placed with its axis in the vertical plane with the welding groove in a horizontal plane. The pipe shall remain in these fixed positions during welding.

WELDING: The stringer, filler and stripped beads shall be deposited by the downhill welding method. The cover pass may be deposited uphill or downhill method depending upon appearance requirements for exposed piping.

The stringer bead shall be deposited so as to completely fuse the abutting edges of the lands and beveled parts of the joint. There shall be complete penetration with a minimum inside buildup of 1/32" and a maximum buildup of 1/8" when external line-up clamps are used, the clamp shall be held in place until at least 50% of the circumference is welded in increments spaced equally around the pipe.

The maximum time interval between the completion of the stringer bead and the beginning of the hot pass shall not exceed five minutes.

Two successive passes shall not be started at the same point. Each pass shall be completed before the next pass is started. A stripper or short bead shall be used to build up low areas.

All slag, knots of filler metal, and similar surfaces defects shall be removed with a power grinder, diamond point or round nose chisel.

The cover bead shall be deposited by a weaving motion.

COOLING: There shall be no accelerated cooling of the weld joint until the temperature of the joint is below 600 F.

ELECTRICAL CHARACTERISTICS AND TRAVEL SPEED

Electrode Size	Amperage	Voltage	Drag Bead (IPM)	Weave Bead (IPM)
3/32	60-100	20-26	12-20	4-10
1/8	100-160	20-26	10-18	4-10
5/32	120-220	20-26	10-18	4-10
3/16	120-220	20-26	8-16	2-8

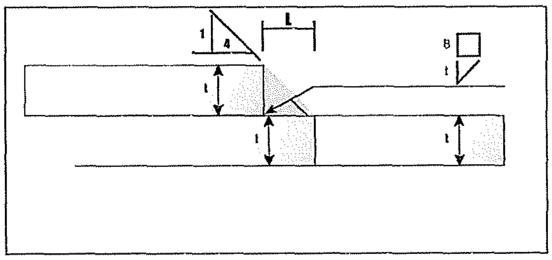
MINIMUM NUMBER OF BEADS: As a minimum, one welding bead shall be deposited for each 3/32" of wall thickness when the pipe wall is .312", or less. When the pipe wall thickness is greater than .312", one welding bead shall be deposited for each 1/16" of wall thickness.

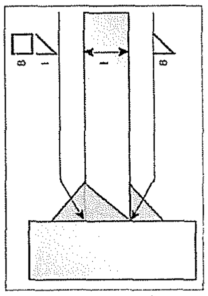
MANUAL ARC WELDING OF FILLET WELDS

This procedure describes the welding of fillet welds in API 5L, 5LX and equivalent materials with similar chemical and physical properties such as ASTM A 106, in all diameters and wall thicknesses. Service tees shall be SAE 1020 steel or equivalent. The procedure to be followed when making a fillet weld is as follows:

JOINT PREPARATION: Generally, all coating shall be removed back at least 9" from the beveled surface prior to welding, However, the thin filmed coatings only need to be removed back a minimum of 1-1/28". All rust, scale, primer, oil and other material which may be detrimental to the finished weld must be removed from the welding surfaces.

The joint design is shown below. For full encirclement type lap joints, the maximum dimension of L is 1.25 , t_1 or t_2, whichever is smaller. If the pad thickness of a full encirclement type lap joint is greater than 1.25 , t_1 the pad shall be tapered 1 to 4 to a thickness of t1 at the weld, For pad or saddle type lap joints, the maximum dimension of L is t_1 or t_2, whichever is smaller, If the thickness of a pad or saddle type lap joint is greater than t_1, it shall be tapered 1 on 4 to a thickness of t_1 at the weld. For fillet joints, the maximum dimension of L is 1.25, t_1 or 1.25, t_2, whichever is smaller.





FILLER METAL: Welding electrodes shall be kept dry and protected from any mechanical damage or deterioration. Filler metals and fluxes shall be stored and handled so as to avoid damage to them and to the containers in which they are shipped. Those in opened containers shall be protected from deterioration and filler metals which are coated shall be protected from excessive moisture changes. Electrodes which show signs of deterioration or suspected to be defective shall not be used.

When welding API 5L pipe, either E 6010 or E 7010 electrodes may be used for all beads. An alternate method is

E 6010 electrodes for the stringer and E 7010 used for all cover beads. When welding API 5LX52, API 5LX60 or API 5LX65, (high yield strength pipe) the E 7010 or E 8010 electrodes may be used for all passes. An alternate method is E 6010+ electrode for the stringer and all cover beads with the E 7010 or E 8010 electrodes.

SIZE OF ELECTRODE: Either 1/8", 5/32" or 3/16" diameter electrodes should be used.

GROUND CLAMP: Welding the ground clamp to the pipe is prohibited.

TACK WELDING: As needed.

POSITIONS: All positions.

WELDING: The number of passes depends upon the size of the fillet weld. The size of a fillet weld is the length of a side of the largest inscribed right triangle having two equal sides. An ideal fillet weld is neither concave nor convex.

All slag, knots of filler metal, and similar surface defects shall be removed with a power grinder, diamond point or round nose chisel.

When the cover bead requires more than one pass it shall be laced.

COOLING: There shall be no accelerated cooling of the weld joint until the temperature of the joint is below 600 F.

ELECTRICAL CHARACTERISTICS AND TRAVEL SPEED

Electrode Size	Amperage	Voltage	Drag Bead (IPM)	Weave Bead (IPM)
3/32	60-100	20-26	12-20	4-10
1/8	100-160	20-26	10-18	4-10
5/32	120-220	20-26	10-18	4-10
3/16	120-220	20-26	8-16	2-8

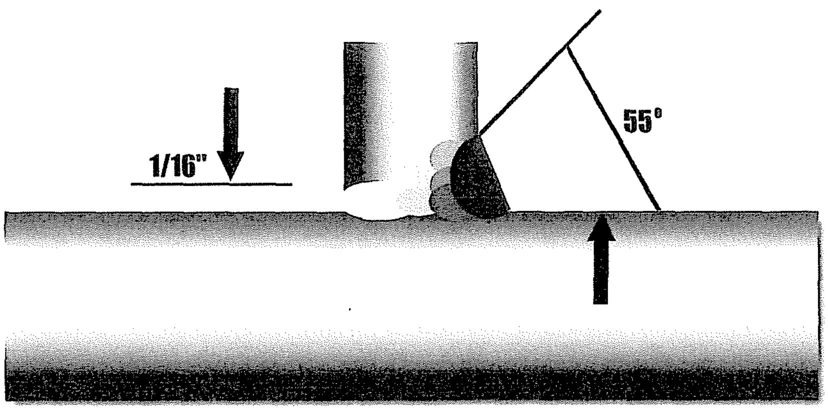
MINIMUM NUMBER OF BEADS: As a minimum, one welding pass shall be deposited for each 1/8" length of dimension "L."

MANUAL ARC WELDING OF BRANCH CONNECTIONS

This position describes the welding of branch connections in API 5L, 5LX and equivalent materials with similar chemical and physical properties such as ASTM A 106, in all diameters and wall thicknesses.

The procedure to be followed when making a branch connection in mild steel as follows:

JOINT PREPARATION: Generally, all coating shall be removed back at least 9" from the beveled surface prior to welding. However, the thin filmed coatings only need to be removed back a minimum of 1-1/2". All rust, scale, primer, oil and other material which may be detrimental to the finished weld must be removed from the welding surfaces.



SUPPORT: The pipe shall be supported so that there is no strain on the stringer bead and so the pipe will be supported until the weld is completed.

FILLER METAL: Welding electrodes shall be kept dry and protected from any mechanical damage or deterioration. Filler metals and fluxes shall be stored and handled so as to avoid damage to them and to the containers in which they are shipped. Those in opened containers shall be protected from deterioration and filler metals which are coated shall be protected from excessive moisture changes. Electrodes which show signs of deterioration or suspected to be defective shall not be used.

When welding API 5L pipe, either E6010 or E7010 electrodes may be used for all beads. An alternate method is E6010 electrodes for the stringer and E7010 used for all cover beads.

When welding API 5LX52, API5LX60 or API 5LX65, (high yield strength pipe) the E 7010 or E 8010 electrodes may be used for all passes.

An alienate method is E 6010+ electrode for the stringer and all cover beads with the E 7010 or E 8010 electrodes.

SIZE OF ELECTRODE: The electrode sizes listed in the following tables are the maximum diameter electrode that can be used.

BEAD	METHOD	ELECTRODE SIZE
Stringer	Drag	5/32"
All Fillers	Bead	5/32"
Cover	Lace	5/32"

GROUND CLAMP: Welding the ground clamp to the pipe is prohibited.

TACK WELDING: If tack welding is used, the tack welds are to be considered as part of the stringer bead. They shall be 3" long and spaced 90° apart. If a tack or any part of the stringer bead, cracks or breaks, the weld shall be cut out and the pipe and/or fitting ends re-beveled. Tacks of excessive thickness shall be cut down with a power grinder, diamond point or round nose chisel. The use of an oxy-acetylene cutting torch or a welding electrode will not be permitted for removing excessive metal.

POSITION: All position.

WELDING: The stringer, filler and stripped beads shall be deposited by the downhill welding method. The cover pass may be deposited uphill or downhill method depending upon appearance requirements for exposed piping.

The stringer bead shall be deposited so as to completely fuse the abutting edges of the lands and beveled parts of the joint. There shall be complete penetration with a minimum inside buildup of 1/32" and a maximum buildup of 1/8".

When external line-up clamps are used, the clamp shall be held in place until at least 50% of the circumference is welded in increments spaced equally around the pipe.

The maximum time interval between the completion of the stringer bead and the beginning of the hot pass shall not exceed five minutes. Two successive passes shall not be started at the same point. Each pass shall be completed before the next pass is started. A stripper or short bead shall be used to build up low areas.

All slag, knots of filler metal, and similar surfaces defects shall be removed with a power grinder, diamond point or round nose chisel.

The size of a fillet weld is the length of a side of the largest inscribed right triangle having two equal sides.

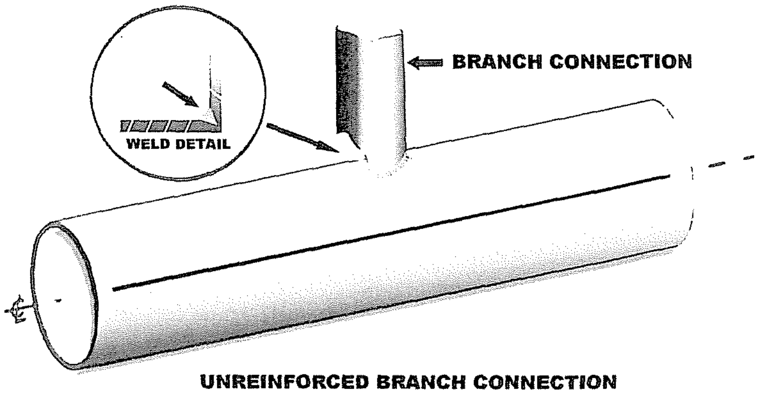
An ideal fillet weld is neither concave nor convex.

COOLING: There shall be no accelerated cooling of the weld joint until the temperature of the joint is below 600 F.

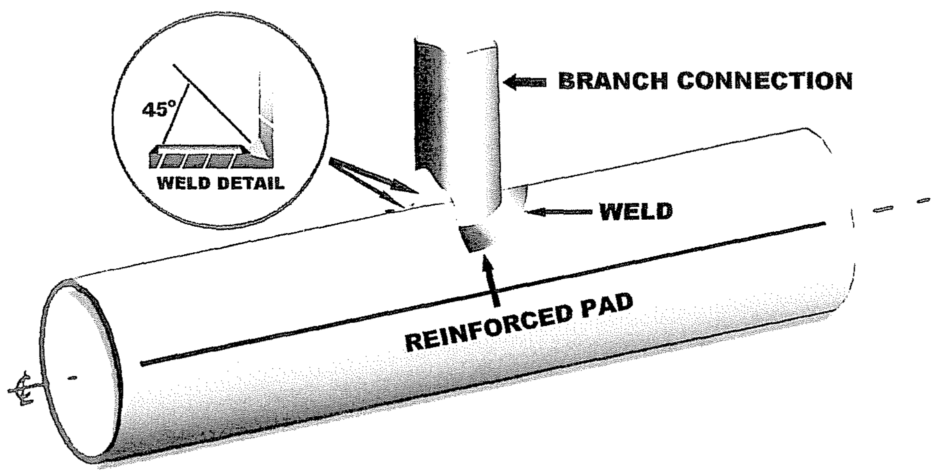
ELECTRICAL CHARACTERISTICS AND TRAVEL SPEED

Electrode Size	Amperage	Voltage	Drag Bead (IPM)	Weave Bead (IPM)
3/32	60-100	20-26	12-20	4-10
1/8	100-160	20-26	10-18	4-10
5/32	120-220	20-26	10-18	4-10
3/16	120-220	20-26	8-16	2-8

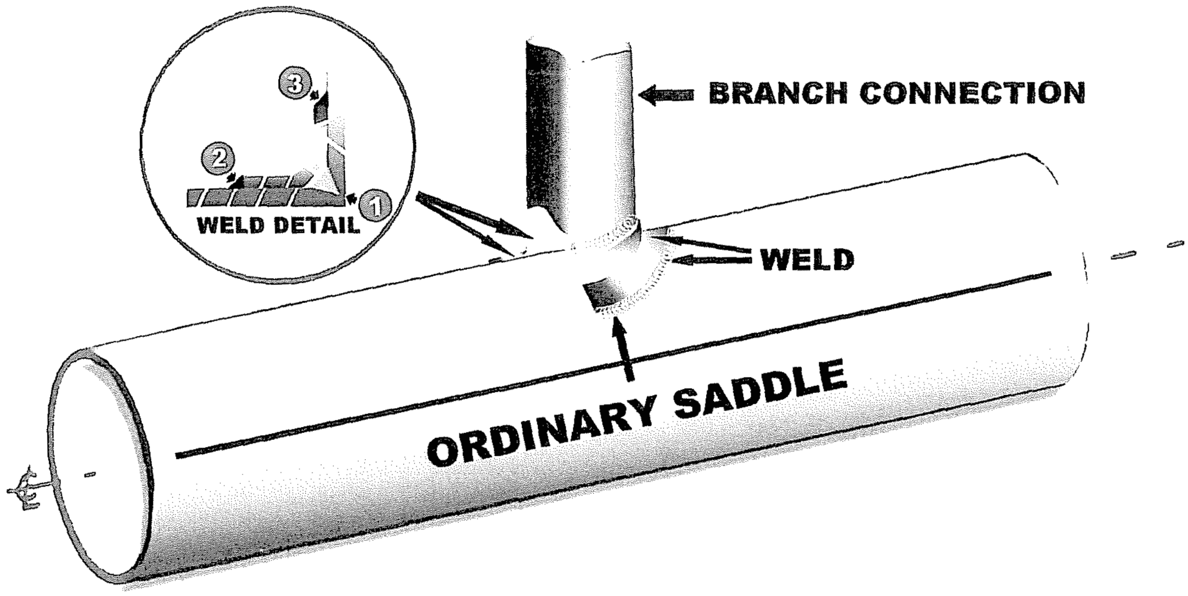
MINIMUM NUMBER OF BEADS: As a minimum, one welding bead shall be deposited for each 3/32" of wall thickness when the pipe wall is .312" or less. When the pipe wall thickness is greater than .312", one welding bead shall be deposited for each 1/16" of wall thickness.



UNREINFORCED BRANCH CONNECTION



BRANCH CONNECTION W/REINFORCED PAD



BRANCH CONNECTION W/SADDLE

SMAW MANUAL ARC WELDING ON PIPELINES UNDER PRESSURE

See Welding Safety Procedures for precautions that should be taken to avoid explosions of gas-air mixtures. The procedure to be followed when welding on a pipeline containing gas under pressure is as follows:

LIMITATION: When welding is to be done on a pipeline operating at a stress level greater than 30% of the specified minimum yield strength of the pipeline, the wall thickness of the pipe shall be determined by the use of a wall thickness gage prior to welding. If lamination is present, the hot tap shall be relocated, otherwise the tap can be made provided the pressure in the line is reduced to Type "D" Construction design pressure based on the measured wall thickness. In special cases, welding may begin without reducing the pressure if the measured wall is not less than 90% of the nominal wall thickness and the nominal wall thickness is not .250" or less.

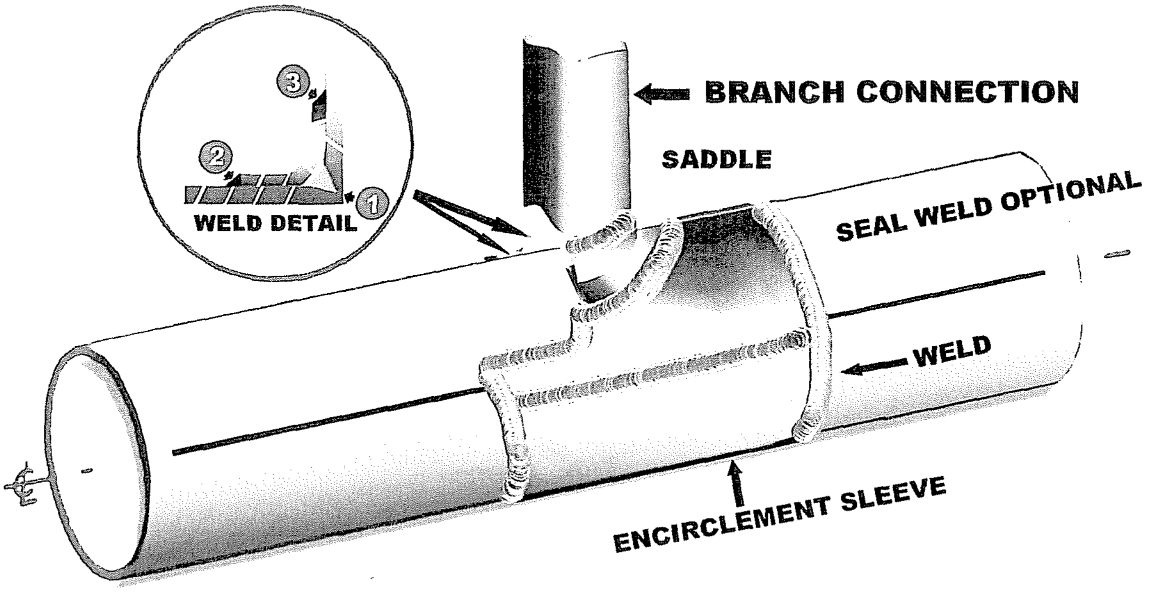
Hot taps shall be located so that they do not intersect a longitudinal or girth seam.

JOINT PREPARATION: Generally, all coating shall be removed back at least 9" from the beveled surface prior to welding. However, the thin filmed coatings only need to be removed back a minimum of 1-½" all rust, scale, primer, oil and other material which may be detrimental to the finished weld must be removed from the welding surfaces.

SUPPORT: The pipe shall be supported so that there is no strain on the stringer bead and so the pipe will be supported until the weld is completed.

FILLER METAL: Low Hydrogen electrodes (E 6016, E 7016, E 6018, or E 7018) shall be used when welding API 5LX pipe or equivalent, or pipe of an unknown grade. E 6010, or E 7010, welding electrodes may be used only when welding API 5L grade pipe or equivalent.

Low hydrogen electrodes shall be stored and handled in a manner to prevent absorption of moisture. They can be purchased in the usual manner and distributed to the welders in 10 pound moisture proof packets. Electrodes left overnight without the proper protection shall not be used without first being heated in a drying oven to 700° F and



BRANCH CONNECTION W/ENCIRCLEMENT SLEEVE/SADDLE

being held at this temperature for two hours. Proper storage facilities shall be provided for electrodes removed from sealed moisture proof containers. A storage cabinet and/or drying oven shall be provided, centrally located within the group. The cabinet should contain Silica-Gel, or a similar material, to absorb excess moisture. An electric drying oven or small storage tub, made of 4" pipe and containing Silica-Gel, shall be standard equipment with all welding units for overnight storage of opened unused low hydrogen electrodes. All welders qualified to use this type electrode will be thoroughly instructed in the storage and handling requirements.

PASS	SIZE	METHOD E 6010 & E 7010	METHOD LH 7018
Stringer	3/32- or 1/8	Downhill	Uphill
Filler	1/8- or 5/32	Downhill	Uphill
Cover	1/8- or 5/32	Downhill	Uphill

A. One size smaller electrode may be used when using iron powder electrodes.

B. An uphill cover pass is optional on exposed piping.

GROUND CLAMP: Welding the ground clamp to the pipe is prohibited.

TACK WELDING: If tack welding is used, the tack welds are to be considered as part of the stringer bead. They shall be 1" long and spaced 90° apart. If a tack or any part of the stringer bead, cracks or breaks, the weld shall be cut out and the pipe and/or fitting ends rebeveled. Tacks of excessive thickness shall be cut down with a power grinder, diamond point or round nose chisel. The use of an oxy-acetylene cutting torch or a welding electrode will not be permitted for removing excessive metal.

When welding API SL pipe or making unreinforced branch connections, (putting on tees) either E 6010 or E 7010 electrodes may be used for all beads. An alternate method is E 6010 electrodes for the stringer and E 7010 used for all cover beads.

When welding API SLXS2, API SLX60 or API SLX6S, (high yield strength pipe) the E7010 or E8010 electrodes may be used for all passes. An alternate method is E6010+ electrode for the stringer and all cover beads with the E7010 or E8010 electrodes.

When welding the reinforcement, the welding procedure described in **MANUAL ARC WELDING OF FILLET WELDS**, shall be followed, except that low hydrogen type electrodes shall be used.

The stringer bead shall be deposited so as to completely fuse the abutting edges of the lands and beveled parts of the joint. There shall be complete penetration with a minimum inside buildup of 1/32" and a maximum buildup of 1/8".

When external line-up clamps are used, the clamp shall be held in place until at least 50% of the circumference is welded in increments spaced equally around the pipe.

The maximum time interval between the completion of the stringer bead and the beginning of the hot pass shall not exceed five minutes.

Two successive passes shall not be started at the same point. Each pass shall be completed before the next pass is started. A stripper or short bead shall be used to build up low areas.

All slag, knots of filler metal, and similar surfaces defects shall be removed with a power grinder, diamond point or round nose chisel.

The size of a fillet weld is the length of a side of the largest inscribed right triangle having two equal sides. An ideal fillet weld is neither concave nor convex.

The cover bead shall be **LACED**.

COOLING: There shall be no accelerated cooling of the weld joint until the temperature of the joint is below 600° F.

LEAK TEST: A leak test shall be made on the branch connection, (tee) prior to drilling through the carrier pipe, (tapping the main).

ELECTRICAL CHARACTERISTICS AND TRAVEL SPEED

Electrode Size	Amperage	Voltage	Drag Bead (IPM)	Weave Bead (IPM)
3/32	60-100	20-26	12-20	4-10
1/8	100-160	20-26	10-18	4-10
5/32	120-220	20-26	10-18	4-10
3/16	120-220	20-26	8-16	2-8

MINIMUM NUMBER OF BEADS: As a minimum, one welding bead shall be deposited for each 3/32" of wall thickness when the pipe wall is .312" or less. When the pipe wall thickness is greater than .312", one welding bead shall be deposited for each 1/16" of wall thickness.

SHIELDED METAL ARC WELDING (SMAW)

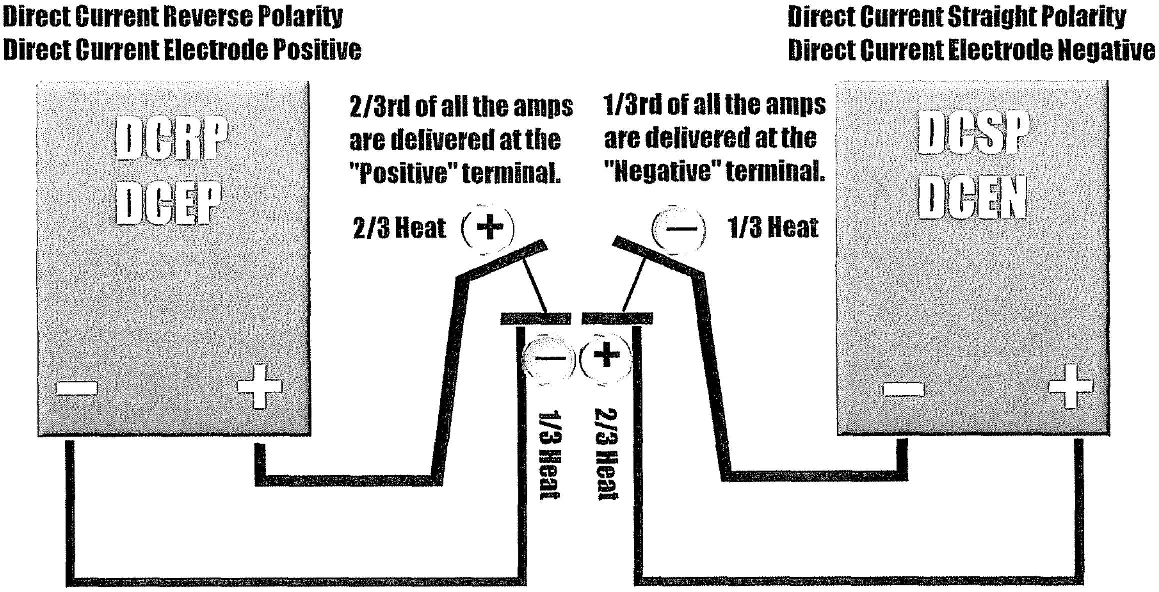
INTRODUCTION

Arc welding is a process that provides a sufficient strength of electrical current to the weld zone, upon which an arc of approximately 10,000 to 14,000° F is created. The arc's intensity melts the electrode and the base metal at an equal rate. The electrode breaks down and travels through the arc and is deposited into the molten puddle formed in the base metal. The electrodes break-down is equal to the base metals consumption, thus performing a weld.

ARC WELDING EQUIPMENT

POLARITY DCRP and DCSP

To understand an Arc Welder, one must first understand electrical current. There are two types of current associated with the Arc Welder. They are (Direct Current and Alternating Current). Direct Current (DC) has two polarities, the polarities are Reverse Polarity (DCRP) and Straight Polarity (DCSP). The two different polarities perform two completely different functions. The current whether DCRP or DCSP will always flow from the negative terminal to the positive terminal. When changing from one polarity to another, what happens is, the direction of current reverses one from the other but still flows from the negative terminal to the positive terminal. See Figure 1-1, shown below.



FIGURE# 1-1

Lets take a look at the two polarities for a moment to determine our advantages the two posses. First we will look at DCRP and its advantages. With DCRP the electrode is the positive side of the cycle and the base metal is the negative side of the cycle. The positive side of the cycle will produce 2/3 of the heat generated from the current delivered. The base metal will produce 1/3 the heat generated from the current delivered. With DCSP the electrode is the negative side of the cycle and the base metal is the positive side of the cycle. The electrode will produce 1/3 the heat generated from the current delivered. The base metal will produce 2/3 the heat generated from the current delivered. Use Figure 1-1, to see the comparison of the two polarities.

With DCRP the electrode holds 2/3 the heat and the base metal holds 1/3 the heat. This means the electrode is twice as hot as the base metal. The base metal is not heating up as fast as the electrode, which means the penetration will be minimal and the build up of the welding bead will be excessive in height compared to the penetration. The application of DCRP should be used to weld metals 3/8" and thinner in diameter wall thickness. This application would produce minimized penetration.

With DCSP the electrode holds 1/3 the heat and the base metal holds 2/3 the heat. This means the base metal is twice as hot as the electrode. The base metal breaking down twice as fast as the electrode means that the penetration will be excessive and the weld bead will be minimal in height compared to the penetration. The application of DCSP should be used to weld metals greater than 3/8" in diameter wall thickness. This weld would produce excessive penetration.

The four recognized basic welding positions are (1) Flat (2) Vertical (3) Horizontal (4) Overhead. When using the application of Arc Welding, one must take in to consideration the position the weld will be made in. The recommended polarity for (Flat) is DCRP and DCSP, the two polarity option for flat will be determined by the diameter of the base metal. The recommended polarity for (Vertical), (Horizontal) and (Overhead) is DCSP. The reason for DCSP for all the up position welds is that gravity is the welders worst enemy and an excessive buildup on the surface of the base metal would have a tendency to sag creating a cold shoulder or peaking in the center of the bead with a lack of penetration if when using DCRP. Thus the need for a quality weld, thus the need for DCSP for up position welds.

NOTE: The electrode and the base metal is the resistance in the welding circuit. Thus the break down of the electrode and the base metal during welding.

AWS Classification	Type of Covering (Flux)	Designed Position	Type of Current
E60 Series Electrodes			
E6010	**High Cellulose/Sodium**	**F, V, OH, H**	**DCEP**
E6011	**High Cellulose/Potassium**	**F, V, OH, H**	**AC/DCEP**
E6012	**High Titania/Sodium**	**F, V, OH, H**	**AC/DCEN**
E6013	**High Titania/Potassium**	**F, V, OH, H**	**AC/DCEP/DCEN**
E6020	**High Iron Oxide**	**H-Fillet**	**AC/DCEN**
E6022[C]	**High Iron Oxide**	**F**	**AC/DCEP/DCEN**
E6027	**High Iron Oxide/Iron Powder**	**H-Fillet**	**AC/DCEN**
E70 Series Electrodes			
E7014	**Iron Powder/Titania**	**F, V, OH, H**	**AC/DCEP/DCEN**
E7015	**Low Hydrogen/Sodium**	**F, V, OH, H**	**DCEP**
E7016	**Low Hydrogen/Potassium**	**F, V, OH, H**	**AC/DCEP**
E7018	**Low Hydrogen/Potassium/Iron Powder**	**F, V, OH, H**	**AC/DCEP**
E7024	**Iron Powder/Titania**	**H-Fillet**	**AC/DCEP/DCEN**
E7027	**High Iron Oxide/Iron Powder**	**H-Fillet**	**AC/DCEN**
E7028	**Low Hydrogen/Potassium/Iron Powder**	**H-Fillet**	**AC/DCEP**
E7048	**Low Hydrogen/Potassium/Iron Powder**	**F, OH, H, V-Down**	**AC/DCEP**

Abbreviation: ❶ F-Flat, ❷ H-Horizontal, ❸ H-Fillet (Horizontal Fillet), ❹ V-Down (Vertical Down), ❺ V-Vertical, ❻ OH-Overhead. Electrodes E6022[c] classification are for single pass welds only.

AWS Classification	Type of Covering (Flux)	Designed Position	Type of Current
E70 Series-Minimum tensile strength of deposited metal, 70,000 psi (480 MPa)			
E7010-X	High Cellulose/Sodium	F, V, OH, H	DCEP
E7011-X	High Cellulose/Potassium	F, V, OH, H	AC/DCEP
E7015-X	Low Hydrogen/Sodium	F, V, OH, H	DCEP
E7016-X	Low Hydrogen/Potassium	F, V, OH, H	AC/DCEP
E7018-X	Iron Powder/Low Hydrogen	F, V, OH, H	AC/DCEP
E7020-X	High Iron Oxide	H/F-Fillet	AC/DCEP/DCEN
E7027-X	Iron Powder/Iron Oxide	H/F-Fillet	AC/DCEP/DCEN
E80 Series-Minimum tensile strength of deposited metal, 80,000 psi (550 MPa)			
E8010-X	High Cellulose/Sodium	F, V, OH, H	DCEP
E8011-X	High Cellulose/Potassium	F, V, OH, H	AC/DCEP
E8013-X	High Titania/Potassium	F, V, OH, H	AC/DCEP/DCEN
E8015-X	Low Hydrogen/Sodium	F, V, OH, H	AC/DCEP
E8016-X	Low Hydrogen/Potassium	F, V, OH, H	AC/DCEP
E8018-X	Iron Powder/Low Hydrogen	F, V, OH, H	AC/DCEP
E90 Series-Minimum tensile strength of deposited metal, 90,000 psi (620 MPa)			
E9010-X	High Cellulose/Sodium	F, V, OH, H	DCEP
E9011-X	High Cellulose/Potassium	F, V, OH, H	AC/DCEP
E9013-X	High Titania/Potassium	F, V, OH, H	AC/DCEP/DCEN
E9015-X	Low Hydrogen/Sodium	F, V, OH, H	DCEP
E9016-X	Low Hydrogen/Potassium	F, V, OH, H	AC/DCEP
E9018-X	Iron Powder/Low Hydrogen	F, V, OH, H	AC/DCEP
E100 Series-Minimum tensile strength of deposited metal, 100,000 psi (690 MPa)			
E10010-X	High Cellulose/Sodium	F, V, OH, H	DCEP
E10011-X	High Cellulose/Potassium	F, V, OH, H	AC/DCEP
E10013-X	High Titania/Potassium	F, V, OH, H	AC/DCEP/DCEN
E10015-X	Low Hydrogen/Sodium	F, V, OH, H	DCEP

E10016-X	Low Hydrogen/Potassium	F, V, OH, H	AC/DCEP
E10018-X	Iron Powder/Low Hydrogen	F, V, OH, H	AC/DCEP
E110 Series-Minimum tensile strength of deposited metal, 110,000 psi (760 MPa)			
E11015-X	Low Hydrogen/Sodium	F, V, OH, H	DCEP
E11016-X	Low Hydrogen/Potassium	F, V, OH, H	AC/DCEP
E11018-X	Iron Powder/Low Hydrogen	F, V, OH, H	AC/DCEP
E120 Series-Minimum tensile strength of deposited metal, 120,000 psi (830 MPa)			
E12015-X	Low Hydrogen/Sodium	F, V, OH, H	DCEP
E12016-X	Low Hydrogen/Potassium	F, V, OH, H	AC/DCEP
E12018-X	Iron Powder/Low Hydrogen	F, V, OH, H	AC/DCEP

NOTE: The letter suffix "X" as used in this table stands for the suffixes A1, B1, B2, Etc., and designates the chemical composition of the deposited weld metal.

Suggested Thickness		Electrode Size		E6011 and E6011	E6012	E6013	E6020	E6022	E6027
Inches.	mm	Inches.	mm						
1/16 & less	1.6 & less	1/16	1.6		20-40	20-40			
1/16 - 5/64	1.6 - 2.0	5/64	2.0		25-60	25-60			
5/64 - 1/8	2.0 - 3.2	3/32	2.4	40-80	35-85	45-90			
1/8 - 1/4	3.2 - 6.4	1/8	3.2	75-125	80-140	80-130	100-150	100-160	125-185
1/4 - 3/8	6.4 - 9.5	5/32	4.0	110-170	110-190	105-180	130-190	140-190	169-240
3/8 - 1/2	9.5 - 12.7	3/16	4.8	140-215	140-240	150-230	175-250	170-400	210-300
½ - 3/4	12.7 - 19.1	7/32	5.6	170-250	200-320	210-300	225-310	370-520	250-350
3/4 - 1	19.1 - 25.4	1/4	6.4	210-320	250-400	250-350	275-375		300-420
1 & greater	25.4 - up	5/16	8.0	275-425	300-500	320-430	340-450		375-475

Suggested Thickness		Electrode Size		E70114	E7015 & E7016	E7018	E7024 & E7028	E7027	E7048
Inches.	mm	Inches.	mm						
5/64 - 1/8	2.0 - 3.2	3/32	2.4	80-125	65-110	70-100	100-145		
1/8 - 1/4	3.2 - 6.4	1/8	3.2	110-160	100-150	115-165	140-190	125-185	80-140
1/4 - 3/8	6.4 - 9.5	5/32	4.0	150-210	140-200	150-220	180-250	160-240	150-220
3/8 - 1/2	9.5 - 12.7	3/16	4.8	200-275	180-255	200-275	230-305	210-300	210-270
½ - 3/4	12.7 - 19.1	7/32	5.6	260-340	240-320	260-340	275-365	250-350	
3/4 - 1	19.1 - 25.4	1/4	6.4	330-415	300-390	315-400	335-430	300-420	
1 & greater	25.4 - up	5/16	8.0	390-500	375-475	375-470	400-525	375-475	

AMPERAGE OUTPUT

It is important to understand the voltage-current(amperes) characteristics of the DC Arc Welder. What are amperes and voltage in relationship to Arc Welding? Amperes is the amount of electricity in store, the voltage is the pressure (EMF) of the current traveling through the arc.

As we look at the control side of the (Lincoln Shield-Arc SA250) we see a control knob with five ranges surrounding it. It is labeled CURRENT RANGE SELECTION. This is your amperage ranges (Course Range Amperage), the amount of (electricity in store). To the right of this control knob is the FINE CURRENT ADJUSTMENT. This is your fine adjustment for the delivery of your (Amperage Output), what you want at the weld zone. The FINE CURRENT ADJUSTMENT knob is surrounded by a group of numbers 0-100. These numbers are a scale in percentage, 0 to 100%. This control can be dialed in to give you a desired output in a particular range.

EXAMPLE: Lets say that you want a 100 amp output delivery to the weld zone. First, find the range that the desired output falls within. Then use your fine adjustment to achieve the desired output.

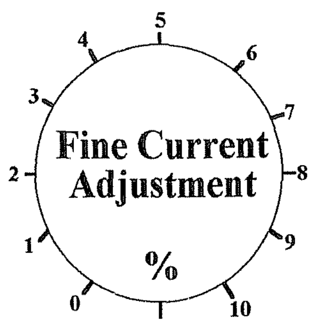
SET YOUR RANGE FOR SUCCESS

Step #1: Your desired output is 100 amps

Step #2: Course Range on welder (65-115) difference in the range (50 amps)

Step #3: How many more amps do you need above the low end of the range (100 - 65 = 35 more amps)
Step #4: Divide the amps needed (35 amps) by the amount of amps in the range (welder) (35 ÷ 50 = 0.7/70%)

Step #5: If you take the "Fine Current Adjustment" (knob/bar) and position to (.7)(70%.) From the range (65-115) there is 50 amps in the entire range. Take the (0.7 x 50 = 35 amps needed)(35 amps added to the low end of your range (65 amps) will produce 100 amps desired (35 + 65 = 100 amps)



NOTE: After working the fine adjustment into the range, take your output and add it back to the low end of the range to get the desired output.

All this information means nothing unless you know what the desired output is for a specific task. To truly achieve quality in the weld you must follow an engineering table that gives you the output for a specific task.

SMAW TABLE 1

SUGGESTED METAL THICKNESS		ELECTRODE SIZE	EE6010 E6011	E6012 E6013	E7018
1/16"	1.6mm	1/16"	40-80	20-40	******
5/64"	2.0mm	5/64"	40-80	25-60	******
1/8"	3.2mm	3/32"	40-80	45-90	70-100
1/4"	6.4mm	1/8"	75-125	80-130	115-165
3/8"	9.5mm	5/32"	110-170	105-180	150-220
1/2"	12.7mm	3/16"	140-215	150-230	200-275
3/4"	19.1mm	7/32"	170-250	210-300	260-340
1"	25.4mm	1/4"	210-320	250-350	315-400
LARGER	******	5/16"	275-425	320-430	375-470

NOTE: This table is arranged just as an operator would approach a specific welding job. The operator must first identify the thickness of the stock to be welded. This identification will give the operator the matching information he/she needs for the task. The identification of the diameter of the stock tells the operator the size electrode, and then gives the operator a choice of electrode classifications. After choosing the correct electrode to perform the task, the operator will pinpoint the amperage range he/she must use.

To get the desired output the table has given us, we must use the **FINE CURRENT ADJUSTMENT** to achieve the pinpointed amperage output. By taking a standard engineering table which gives us an amperage range we must understand one overriding thing about the engineering range. The range is set up for a standard 50% **FINE CURRENT ADJUSTMENT** to pinpoint the desired amperage output. This means that if we set the fine adjustment on 50% for the range we are in, we will deliver an amperage output of half again as much and then added back to the lowest end of the range.

ELECTRODES

Electrodes come with coding on the lower section of the flux covering. The electrodes may have a series of numbers or they may have colored dots to identify the electrode. The most common identification on electrodes is the numbering system. The numbers or colored dots give you all the information about the electrode.

The coding tells the welder the type of metal the electrode is constructed of, the type of current it is to be used with, the tensile strength of the weld upon completion, the position it is to be used with and the chemical composition of the flux covering. See the example below for identification of an electrode.

EXAMPLE:

E6010 - (Electrode classification)	E7018 - (Electrode classification)
E- Electrode	**E- Electrode**
6_ 60,000 psi tensile strength (elasticity)	**7_ 70,000 psi tensile strength (elasticity)**
0	**0**
1- Position the electrode is design for (ALL)	**1- Position the electrode is designed for(ALL)**
0- Flux covering (chemical composition)	**8- Flux covering (chemical composition)**

NOTE: When looking at the flux covering identification number, it tells the welder the chemical composition and what type of current and polarity the electrode is to be used with. The one thing it does not tell the welder is, is the amount of flux covering on the electrode. It does not tell the welder if it is a lightly coated (dusted) electrode or a heavy coated electrode.

The amount of flux coating equates to tensile strength. Look at the example below to get a better understanding of this effect.

EXAMPLE

E6018	E7018
E- Electrode	**E- Electrode**
6_ 60,000 psi tensile	**7_ 60,000 psi tensile**
0	**0**
1- Position	**1- Position**
8- Flux composition	**8- Flux composition**

The E6018 has a light coating of flux which allows the weld to cool off quick, creating a hard and brittle bead. The E7018 has a heavy flux coating allowing for a slow cooling, the bead is soft.

Remember the more tensile strength an electrode provides, the softer the weld has become. Remember, tensile is the elasticity of the metal and in order to have more tensile strength the weld must be softer, it must have that stretch ability.

NOTE: If the electrode classification has a dash in the classification number, it means only one thing. The dash number indicates that the electrode metal composition is no longer **MILD STEEL**. See the example below:

EXAMPLE: **E308-16 (Stainless Steel Electrode)**

E- Electrode

3

0- 300 Series Stainless Steel

8

- (No longer Mild Steel)

1- Position

6- Flux Covering (Chemical composition)

The identification of a **STAINLESS STEEL** electrode is evident in the 300 Series description in the classification numbers on the electrode. The 300 Series numbers are in the tensile strength classification section on the electrode. The dash number again indicates the metal composition is no longer Mild Steel.

ARC WELDING PROCEDURE (MOTIONS, ANGLES AND TRAVEL SPEED)

INTRODUCTION

MOTIONS

There are a few things a welder must understand about the principles of current related to Arc Welding before we get started. **The most important thing a welder must know in Arc Welding is, "WIDTH OF THE PUDDLE DICTATES TRAVEL SPEED".** Arc Welding is different in a great many ways from Oxy-acetylene Welding. Lets take Arc Welding one step at a time to understand actually performing a weld, depositing a quality bead with the needed cosmetics.

STEP #1.

When striking an arc, the welder must strike the consumable electrode against the metal to be welded. The striking action completes continuity from the electrode to the base metal. At this point the arc is formed, the end of the electrode must be raised to the correct height which is from 1/16 to 1/8" from the base metal surface. This height must be obtained and maintained for approximately (4 seconds). This allows the electrode time to super-heat and the base metal time to break down in order to receive the deposited metal from the electrode. This prevents a cold weld on the front end of the bead when started.

During the (4 second) delay, before the electrode can be touched to the base metal, the electrode shall be pushed forward approximately 1 to 1.5" without any motion. This action allows the base metal time to break down and receive the depositing electrode, allowing for deep penetration and proper fusion from the start of the weld. By the time the welder reaches the 1 to 1.5" forward distance, the puddle will have expanded to the correct width of the puddle the welder wishes to maintain. At this point the welder must apply the desired angle and motion as the welder leaves the starting point and starts in the drag direction of the weld.

STEP #2.

When leaving the starting point of the weld, the width should already be established. In order to maintain the width on the puddle, the welder must do different things for different motions and angles. Lets take a look at the different motions. See the example below.

In Figure #1, this is a small tight circular motion. The travel speed is dictated by the spread and width of the puddle. The action allows for deep penetration and equal fusion with the width of the puddle. The depth of penetration is equal to the width, thus giving the weld a snowcone effect if viewing it from a phantom exposure. This achieves high quality in the weld with a plus in the area of cosmetics.

In Figure #2, this motion is an elliptic stroke with an oblong and very tight motion. This motion allows for medium penetration with very tight ripples in the bead allowing for great cosmetics. Travel speed is dictated by the width of the puddle. The travel speed for this type motion and weld is faster than the motion in Figure #1.

In Figure #3, this motion is a complete circle of progressing equal circles. This motion allows for minimal penetration with good fusion. The circles are to be equal with each progressing circle to be of equal size. Each progressing circle will cut the previous circle completely in half, creating a shallow penetration and a tight ripple patterned bead.

NOTE: If the desired penetration is deep into the base metal the welder would choose the motion in Figure #1. If the desired penetration is for a medium penetration the welder would choose the motion in Figure #2. If the desired penetration is for minimal depth, the welder would choose Figure #3.

NOTE: The welder must keep one important thing in mind when choosing a motion. For these three motions there will be good build up without being excessive but there will be build up.

There are other things to create depth of penetration other than motions. We will look at these in the next topic **"ANGLES"**.

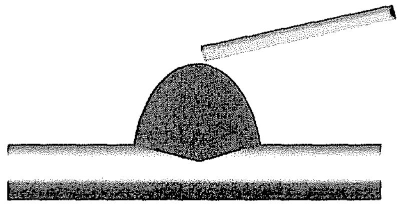
ANGLES

When a welder prepares to weld a bead, the welder must take into account the diameter of the stock to be welded. We are going to look at three different diameters of (Mild Steel) stock to determine the angle of attack for the weld. Lets look at angles matched up with the diameter of the stock. (1) 1/8"-20 degrees

(2) 1/4"-45 degrees and (3) 1/2" and greater- 90 degrees. See **ANGLE** See figures #1, #2 and #3.

FIGURE #1

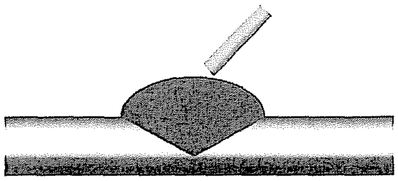
Figure #1, shows 1/8" diameter stock welded at an angle of 20 degrees. Take note of the penetration into the stock.



1/8" Thickness/Electrode Angle 20 Degree

FIGURE #2

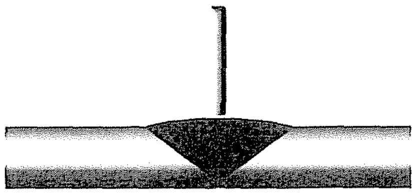
Figure #2, shows 1/4" diameter stock welded at an angle of 45 degrees. Take note of the penetration into the stock.



1/4" Thickness/Electrode Angle 45 Degree

FIGURE #3

Figure #3, shows 1/2" or greater diameter stock welded at an angle of 90 degrees. Take note of the penetration into the stock.



1/2" Thickness/Electrode Angle 90 Degree

NOTE: The welder must always check the diameter of the stock to be welded before the weld is made. The welder must match the process of Arc Welding totally to the weld to be performed. To totally match ever phase of the process to achieve a total quality weld is the most important part of Arc Welding. The welder can possess all the practical application talent in the world but if the process is not set-up properly (matched up) the weld will not possess the most important thing in welding, and that is **QUALITY**. **REMEMBER** that the thickneess of the base metal to be welded is what dictates everything else in the process that follows. See the example below in a step by step order for setting up for a welding task.

TRAVEL SPEED

Travel speed is always dictated by the width of the puddle. If the puddle expands outward and larger than the beads alignment, then your travel speed is to slow. If the beads appearance while welding is tailing off and the width is being reduced, then your travel speed is to fast. A welders number one objective is **QUALITY**. In order to achieve quality, a welder must carefully look at the task to be performed and match all the variables for a desired quality output. All these variables have been mentioned in the previous text but there is the one main focus a welder must never forget. **WIDTH DICTATES TRAVEL SPEED.**

AWS CARBON STEEL
COVERED ARC WELDING ELECTRODES

AWS CLASSIFICATION	RECOMMENDED POSITION OF WELD	TYPE OF CURRENT
E6010	F,V,OH,H	DCEP
E6011	F,V,OH,H	AC or DCEP
E6012	F,V,OH,H	AC or DCEN
E6013	F,V,OH,H	AC, DCEP & DCEN
E6020	H-FILLETS	AC orDCEN
E6022	F	AC, DCEP & DCEN
E6027	H-FILLETS,F	AC or DCEN

A. The abbreviations, F,V,V-Down,OH,H, and H-Fillets indicate the welding positions as follows:

F= Flat

H= Horizontal

H-Fillets= Horizontal Fillets

V-Down= Vertical Down

V= Vertical}_ For electrodes 3/16" and under, except

OH= Overhead} 5/32" and under for classifications E7014, E7015, E7016, and E7018.

B. The term DCEP refers to direct current electrode positive (DC reverse polarity). The term DCEN refers to direct current, electrode negative (DC straight polarity).

C. Electrodes of the E6022 classification are for single-pass welds.

AWS CARBON STEEL

COVERED ARC WELDING ELECTRODES

AWS CLASSIFICATION	RECOMMENDED POSITION OF WELD	TYPE CURRENT
E7014	F,V,OH,H	AC, DCEP & DCEN
E7015	F,V,OH,H	DCEP
E7016	F,V,OH,H	AC or DCEP
E7018	F,V,OH,H	AC or DCEP
E7024	H-Fillets,F	AC, DCEP & DCEN
E7027	H-Fillets,F	AC or DCEN
E7028	H-Fillets,F	AC or DCEP
E7048	F,OH,H,V-Down	AC or DCEP

NOTE: All E70XX electrodes should only be used for fillet and finishing welds (caps).

SAFETY AND SAFETY EQUIPMENT

SAFETY EQUIPMENT

When Arc Welding, precaution must be taken to insure safety to yourself and others around you. These precautions are the responsibility of the welder performing the task, to insure safety for all persons involved in the process.

Lets look at protective clothing for the welder:

1. Shirts should be of 100% cotton with flaps covering the pockets of the shirt and long sleeves. Molten metal can fall into open pockets causing fire and injury.

2. Pants should be of a heavy work cotton or denim. There shall never be cuffs on the pants. The cuffs will catch flying sparks and globules of molten metal causing the pants to catch fire.

3. Shoes must be leather, either shoes or boots. There shall not be any foam-rubber inlay in the tops of the foot wear. The foam-rubber when in contact with molten metal, melts the foam-rubber which burns deep in the skin causing serious damage. Socks are to be cotton. The clothing shall never be Rayon or polyester. Clothing should always be cotton.

4. Jewelry should be removed while welding, due to the potential of shock and burns associated with the intense current, heat and light of the Arc Welder.

5. If the welder wears Glasses, care must be taken to prevent the flying sparks from sticking to and burning into the glass. A welder can destroy a pair of glasses by not taking precautions to protect the lenses.

Lets look at protective equipment for the welder:

1. The ***Welding Helmet*** ***(Hood)*** is one of the most important and vital pieces of safety equipment the welder has for protection of the upper region of the body. The Hood usually has a #10 shade lens installed in the Hood for protection of the eyes. The shade for the Arc Welding Process can be from a #9 to #12 shade lens. The #9 shade lens is recommended for inside use where there is an absence of light. The #12 shade lens is recommended for outside use where there is an abundance of light. The ideal shade for overall welding is the #10 shade lens. The eyes being the main focus for protection is protected by the Hood, if used properly. The face and the eyes must be protected at all times and never exposed to the ultraviolet and infrared rays from the intense light of the arc. The skin must be protected as well as the eyes. The skin can receive serious burns from the arc rays if caution is not taken to protect the skin. **KEEP THE HOOD DOWN DURING WELDING**.

NOTE: If the Hood does not cover the neck line, then button up the shirt to cover the skin.

2. ***Leathers*** are the welders protection for the body. Leathers come in full jackets, sleeves, aprons and chaps. The full jackets protect the welders upper body, arms, shoulders and back. The full jacket extends down to the hips for full coverage. The sleeves protect the arms and upper chest area and can be worn in conjunction with the apron which attaches to the sleeves to form a full jacket and can be removed easily if the need arises. The chaps are full leggings which strap around the back of the legs to cover legs and lower body. The chaps also have upper body protection as well. Attached to the leggings is an apron fully attached to form protection for the upper chest area to the toes. The leathers protect against flying sparks, molten globules, ultraviolet rays and hot metal.

3. ***Gloves*** are the welders protection for the hands and wrist area. The Gloves will be the Gauntlet type which cover the hands and the wrist up half way of the forearm. The gloves will be fully leather with no cotton backing on the gloves. Short wrist length gloves should not be worn, because fallen sparks and hot metal will fall on the arms and hands causing burns.

NOTE: If gloves become worn or start to develop holes, replace the gloves and protect yourself against injury. **THINK SAFETY NOT INCONVIENCE "REPLACE THOSE WORN GLOVES"**.

IMPORTANT SAFETY PRECAUTION

Never wrap the welding leads into a continuous loop in a high traffic area. Never stick hands through the open loop of leads while the Arc Welding machine is running. The loop will create a transformer while the machine is running and can cause serious injury if hands or any part of the body is inserted through the loop. This condition is to be avoided at all costs. **THINK SAFETY FIRST NOT LAST, YOUR LIFE COULD DEPEND ON IT.**

DEPARTMENT

OF

TRANSPORTATION

PIPELINE SAFETY REGULATIONS

PART 192 - TRANSPORTATION OF NATURAL OR OTHER GAS BY PIPELINE

MINIMUM FEDERAL SAFETY STANDARDS

SUBPART D DESIGN OF PIPELINE COMPONENTS

192.153 COMPONENTS FABRICATED BY WELDING

A. Except for branch connections and assemblies of standard pipe and fittings joined by circumferential welds, the design pressure of each component fabricated by welding, whose strength cannot be determined, must be established in accordance with paragraph UG-101 of section VIII of the ASME Boiler and Pressure Vessel Code.

B. Each prefabricated unit that used plate and longitudinal seams must be designate, constructed, and tested in accordance with the ASME Boiler and Pressure Vessel Code except for the following:

1) Regularly manufactured butt-welding fittings.

2) Pipe that as been produced and tested under a specification listed in Appendix B to this part.

3) Partial assemblies such as split rings or collars.

4) Prefabricated units that the manufacturer certifies have been tested to at least twice the maximum pressure to which they will be subjected under the anticipated operating conditions.

C. Orange-peel bull plugs and orange-peel swages may not be used on pipelines that are to operate at a hoop stress of 20 percent or more of the SMYS of the pipe.

D. Except for flat closures designed in accordance with section VIII of the ASME Boiler and Pressure Code, flat closures and fish tails may not be used on pipe that either operates at 100 p.s.i.g. or more, or is more than

three inches nominal diameter.

192.155 WELDING BRANCH CONNECTIONS

Each welded branch connection made to pipe in the form of a single connection, or in a header or manifold as a series of connections, must be designed to ensure that the strength of the pipeline system is not reduced, taking into account the stresses in the remaining pipe wall due to the opening in the pipe or header, the shear stresses produced by the pressure acting on the area of the branch opening, and any external loadings due to thermal movement, weight, and vibration.

192.221 SUBPART E - WELDING OF STEEL IN PIPELINES

A. This subpart prescribes minimum requirements for welding steel materials in pipelines.

B. This subpart does not apply to welding that occurs during the manufacture of steel pipe or steel pipeline components.

192.225 WELDING - GENERAL

A. Welding must be preformed by a qualified welder in accordance with welding procedures qualified to produce welds meeting the requirements of this subpart. The quality of the test welds used to qualify the procedures shall be determined by destructive testing.

B. Each welding procedure must be recorded in detail, including the results of the qualifying test. This record must be retained and followed whenever the procedure is used.

192.227 QUALIFICATION OF WELDERS

A. Except as provided in paragraph (B) of this section, each welder must be qualified in accordance with section 3 of API Standard 1104 or section IX of the ASME Boiler and Pressure Vessel Code. However, a welder qualified under an earlier edition than listed in Appendix A may weld but may not re-qualify under that earlier edition.

B. A welder may qualify to perform welding on pipe to be operated at a pressure that produces a hoop stress of less than 20% of SMYS by performing an acceptable test weld, for the process to be used, under the test set forth in section I of Appendix C to this part.

A welder who makes welded service line connections to mains must also perform an acceptable test weld under section II of Appendix C to this part as a part of his/her qualifying test. After initial qualification, a welder may not perform welding unless:

(1) Within the preceding 15 calendar months, the welder has re-qualified, except that the welder must re-qualify at least once each calendar year; or

(2) Within the preceding 7-1/2 calendar months, but at least twice each calendar year, the welder has had

(i) A production weld cut out, tested and found acceptable in accordance with the qualifying test; or

(ii) For welders who work only on service lines 2 inches or smaller in diameter, two sample welds tested and found acceptable in accordance with the test in section III of Appendix C to this part.

192.229 LIMITATIONS ON WELDERS

A. No welder whose qualification is based on nondestructive testing may weld compressor station pipe and components.

B. No welder may weld with a particular welding process unless, within the preceding 6 calendar months he has engaged in welding with that process.

C. A welder qualified under 192.227 (a) may not weld unless within the preceding 6 calendar months the welder has had one weld tested and found acceptable under section 3 or 6 of API STANDARD 1104, except that a welder qualified under an earlier edition previously listed in Appendix A may weld but may not re-qualify under that earlier edition.

192.231 PROTECTION FROM WEATHER

The welding operation must be protected from weather conditions that would impair the quality of the completed weld.

192.233 MITER JOINTS

A. A miter joint on steel pipe to be operated at a pressure that produces a hoop stress of 30% or more of SMYS may not deflect the pipe more than 3°.

B. A miter joint on steel pipe to be operated at a pressure that produces a hoop stress of less than 30%, but more than 10% of SMYS may not deflect the pipe more than 12 1/2° and must be a distance equal to one pipe diameter or more away from any other miter joint, as measured from the crotch of each joint.

C. A miter joint on steel pipe to be operated at a pressure that produces a hoop stress of 10% or less of SMYS may not deflect the pipe more than 90°.

192.235 PREPARATION FOR WELDING

Before beginning any welding, the welding surfaces must be clean and free of any material that may be detrimental to the weld, and the pipe or component must be aligned to provide the most favorable condition for depositing the root bead. This alignment must be preserved while the root bead is being deposited.

192.241 INSPECTION AND TEST OF WELDS

A. Visual inspection of welding must be conducted to insure that:

(1) The welding is performed in accordance with the welding procedure; and

(2) The weld is acceptable under paragraph (c) of this section.

B. The welds on a pipeline to be operated at a pressure that produces a hoop stress of 20% or more of SMYS must be nondestructively tested in accordance with 192.243, except that welds that are visually inspected and approved by a qualified welding inspector need not be nondestructively tested if:

(1) The pipe has a nominal diameter of less than 6 inches; or

(2) The pipeline is to be operated at a pressure that produces a hoop stress of less than 40% of SMYS and the welds are so limited in number that nondestructive testing is impractical.

C. The acceptability of a weld that is nondestructively tested or visually inspected is determined according to the standards in section 6 of API Standard 1104.

192.243 NONDESTRUCTIVE TESTING

A. Nondestructive testing of welds must be performed by any process, other than trepanning, that will clearly indicate defects that may affect the integrity of the weld.

B. Nondestructive testing of welds must be performed:

(1) In accordance with written procedures; and

(2) By persons who have been trained and qualified in the established procedures and with the equipment employed in testing.

C. Procedures must be established for the proper interpretation of each nondestructive test of a weld to ensure the acceptability of the weld under 192.241 ©.

D. When nondestructive testing is required under 192.241 (b), the following percentages of each day's field butt welds, selected at random by the operator, must be nondestructively tested over their entire circumference;

(1) In Class locations, except offshore, at least 10%.

(2) In class 2 locations, at least 15%.

(3) In class 3 and class 4 locations, at crossings of major or navigable rivers, offshore, and within railroad or public highway right-of-ways, including tunnels, bridges, and overhead road crossings, 100% unless impracticable, in which case at least 90%. Nondestructive testing must be impracticable for each girth weld not tested.

(4) At pipeline tie-ins, 100%.

E. Except for a welder whose work is isolated from the principal welding activity, a sample of each welder's work for each day must be nondestructively tested, when nondestructively testing is required under 192.241 (b).

F. When nondestructive testing is required under 192.241 (b), each operator must retain, for the life of the pipeline, a record showing by milepost, engineering station, or by geographic feature, the number of girth welds made, the number nondestructively tested, the number rejected, and the disposition of the rejects.

192.245 Repair or removal of defects

A. Each weld that is unacceptable under 192.241(c) must be removed or repaired. Except for welds on an offshore pipeline being installed from a pipeline vessel, a weld must be removed if it has a crack that is more than eight percent of the weld length.

B. Each weld that is repaired must have the defect removed down to sound metal and the segment to be repaired must be preheated if conditions exist which would adversely affect the quality of the weld repair. After repair, the segment of the weld that was repaired must be inspected to ensure its acceptability.

C. Repair of a crack, or of any defect in a previously repaired area must be in accordance with written weld repair procedures that have been qualified under 192.225. Repair procedures must provide that the minimum mechanical properties specified for the welding procedure used to make the original weld are met upon completion of the final weld repair.

192.309 Repair of steel pipe

A. Each imperfection or damage that impairs the serviceability of a length of steel pipe must be repaired or removed. If a repair is made by grinding, the remaining wall thickness must at least be equal to either:

1) The minimum thickness required by the tolerances in the specification to which the pipe was manufactured; or

2) The nominal wall thickness required for the design pressure of the pipeline.

B. Each of the following dents must be removed from steel pipe to be operated at a pressure that produces a hoop stress of 20 percent, or more, of SMYS:

1) A dent that contains a stress concentrator such as a scratch, gouge, groove, or arc burn.

2) A dent that affects the longitudinal weld or a circumferential weld.

3) In pipe to be operated at a pressure that produces a hoop stress of 40 percent or more of SMYS, a dent that has a depth of:

i) More than one-quarter inch in pipe 12 3/4 inches or less in outer diameter; or

ii) More than 2 percent of the nominal pipe diameter in pipe over 12-3/4 inches in outer diameter. For the purpose of this section a "dent" is a depression that produces a gross disturbance in the curvature of the pipe wall without reducing the pipe-wall thickness. The depth of a dent is measured as the gap between the lowest point of the dent and a prolongation of the original contour of the pipe.

C. Each arc burn on steel pipe to be operated at a pressure that produces a hoop stress of 40 percent or more, of SMYS must be repaired or removed. If a repair is made by grinding, the arc burn must be completely removed and the remaining wall thickness must be at least equal to either:

1) The minimum wall thickness required by the tolerances in the specification to which the pipe was manufactured; or

2) The nominal wall thickness required for the design pressure of the pipeline.

D. A gouge, groove, arc burn, or dent may not be repaired by insert patching or by pounding out.

E. Each gouge, groove, arc burn, or dent that is removed from a length of pipe must be removed by cutting out the damaged portion as a cylinder.

192.313 Bends and elbows

A. Each field bend in steel pipe, other than a wrinkle bend made in accordance with 192.315, must comply with the following:

1) A bend must not impair the serviceability of the pipe.

2) Each bend must have a smooth contour and be free from buckling, cracks, or any other mechanical damage.

3) On pipe containing a longitudinal weld, the longitudinal weld must be as near as practicable to the neutral axis of the bend unless:

i) The bend is made with an internal bending mandrel; or

ii) The pipe is 12 inches or less in outside diameter or has a diameter to wall thickness ratio less than 70.

B. Each circumferential weld of steel pipe which is located where the stress during bending causes a permanent deformation in the pipe must be non destructively tested either before or after the bending process.

C. Wrought-steel welding elbows and transverse segments of these elbows may not be used for changes in direction on steel pipe that is two inches or more in diameter unless the arc length, as measured along the crotch, is at least one inch.

192.315 Wrinkle bends in steel pipe

A. A wrinkle bend may not be made on steel pipe to be operated at a pressure that produces a hoop stress of 30 percent or more of SMYS.

B. Each wrinkle bend on steel pipe must comply with the following:

1) The bend must not have any sharp kinks.

2) When measured along the crotch of the bend, the wrinkles must be a distance of at least one pipe diameter.

3) On pipe 16 inches or larger in diameter, the bend may not have a deflection of more than 1 1/2" for each wrinkle.

4) On pipe containing a longitudinal weld, the longitudinal seam must be as near as practicable to the neutral axis of the bend.

192.713 TRANSMISSION LINES: PERMANENT FIELD REPAIR OF IMPERFECTIONS AND DAMAGES

A. Except as provided in paragraph (b) of this section, each imperfection or damage that impairs the serviceability of a segment of steel transmission line operating at or above 40% of SMYS must be repaired as follows:

1) If it is feasible to take the segment out of service, the imperfection or damage must be removed by cutting out a cylindrical piece of pipe and replacing it with pipe of similar or greater design strength.

2) If it is not feasible to take the segment out of service, a full encirclement welded split sleeve of appropriate design must be applied over the imperfection or damage.

3) If the segment is not taken out of service, the operating pressure must be reduced to a safe level during the repair operations.

192.715 TRANSMISSION LINES: PERMANENT FIELD REPAIR OF WELDS

Each weld that is unacceptable under 192.241 (c) must be repaired as follows:

A. If it is feasible to take the segment of transmission line out of service, the weld must be repaired in accordance with the applicable requirements of 192.245.

B. A weld may be repaired in accordance with 192.245 while the segment of transmission line is in service if:

1) The weld is not leaking.

2) The pressure in the segment is reduced so that it does not produce a stress that is more than 20% of the SMYS of the pipe; and

3) Grinding of the defective area can be limited so that at least 1/8-inch thickness in the pipe weld remains.

C. A defective weld which cannot be repaired in accordance with paragraph (a) or (b) of this section must be repaired by installing a full encirclement welded split sleeve of appropriate design.

192.717 TRANSMISSION LINES: PERMANENT FIELD REPAIR OF LEAKS

A. Except as provided in paragraph (b) of this section, each permanent field repair of a leak on a transmission line must be made as follows:

1) If it is feasible, the segment of transmission line must be taken out of service and repaired by cutting out a cylindrical piece of pipe and replacing it with pipe of similar or greater design strength.

2) If it is not feasible to take the segment of transmission line out of service, repairs must be made by installing a full encirclement welded split sleeve of appropriate design, unless the transmission line:

(i) Is joined by mechanical couplings; and

(ii) Operates at less than 40% of SMYS.

3) If the leak is due to a corrosion pit, the repair may be made by installing a properly designed bolt-on-leak clamp; or, if the leak is due to a corrosion pit and on pipe of not more than 40,000 psi SMYS, the repair may be made by

fillet welding over the pitted area a steel plate patch with rounded coroners, of the same or greater thickness than the pipe, and not more than one-half of the diameter of the pipe in size.

192.717 TRANSMISSION LINES: TESTING OF REPAIRS

A. Testing of replacement pipe. If a segment of transmission line is repaired by cutting out the damaged portion of the pipe as a cylinder, the replacement pipe must be tested to the pressure required for a new line installed in the same location. This test may be made on the pipe before it is installed.

B. Testing of repairs made by welding. Each repair made by welding in accordance with 192.713, 192.715, and 192.717.

DEPARTMENT OF TRANSPORTATION

PIPELINE SAFETY REGULATIONS

PART 192 - TRANSPORTATION OF NATURAL OR OTHER GAS BY PIPELINE MINIMUM FEDERAL SAFETY STANDARDS

SUBPART D DESIGN OF PIPELINE COMPONENTS

192.191 Design pressure of plastic fittings

A. Thermosetting fittings for plastic pipe must conform to ASTM D 2517.

B. Thermoplastic fittings for plastic pipe must conform to ASTM D 2513. 192.193 Valve installation In plastic pipe

Each valve installed in plastic pipe must be designed so as to protect the plastic material against excessive torsional or shearing loads when the valve or shutoff is operated, and from any other secondary stresses that might be exerted through the valve or its enclosure.

192.281 Plastic pipe

A. General. A plastic pipe joint that is joined by solvent cement, adhesive, or heat fusion may not be disturbed until it has properly set. Plastic pipe may not be joined by a threaded joint or miter joint.

B. Solvent cement joints. Each solvent cement joint on plastic pipe must comply with the following:

1) The mating surfaces of the joint must be clean, dry, and free of material which might be detrimental to the joint.

2) The solvent cement must conform to ASTM Specification D 2513.

3) The joint may not be heated to accelerate the setting of the cement.

C. Heat-fusion joints. Each heat-fusion joint on plastic pipe must comply with the following:

1) A butt heat-fusion joint must be joined by a device that holds the heater element square to the ends of the piping, compresses the heated ends together, and holds the pipe in proper alignment while the plastic hardens.

2) A socket heat-fusion joint must be joined by a device that heats the mating surfaces of the joint uniformly and simultaneously to essentially the same temperature.

3) Heat may not be applied with a torch or other open flame.

D. Adhesive joints. Each adhesive joint on plastic pipe must comply with the following:

1) The adhesive must conform to ASTM Specification D 2517.

2) The materials and adhesive must be compatible with each other.

E. Mechanical joints. Each compression type mechanical joint on plastic pipe must comply with the following:

1) The gasket material in the coupling must be compatible with the plastic.

2) A rigid internal tubular stiffener, other than a split tubular stiffener, must be used in conjunction with the coupling.

192.283 Plastic pipe; qualifying joining procedures

A. Heat fusion, solvent cement, and adhesive joints. Before any written procedure established under 192.273(b) is used for making plastic pipe joints by a heat fusion, solvent cement, or adhesive method, the procedure must be qualified by subjecting specimen joints made according to the procedure to the following tests:

1) The burst test requirements of

i) In the case of thermoplastic pipe, paragraph 8.6 (Sustained Pressure Test) or paragraph 8.7 (Minimum Hydrostatic Burst Pressure) of ASTM D2513; or

ii) In the case of thermosetting plastic pipe, paragraph 8.5 (Minimum Hydrostatic Burst Pressure) or paragraph 8.9 (Sustained Static Pressure Test) of ASTM D2517;

2) For procedures intended for lateral pipe connections, subject a specimen joint made from pipe sections joined at right angles according to the procedure to a force on the lateral pipe until failure occurs in the specimen. If failure initiates outside the joint area, the procedure qualifies for use; and

3) For procedures intended for non-lateral pipe -connections, follow the tensile test requirements of ASTM D638, except that the test may be conducted at ambient temperature and humidity. If the specimen elongates no less than 25 percent or failure initiates outside the joint area, the procedure qualifies for use.

B. Mechanical joints. Before any written procedure established under 192.273(b) is used for making mechanical plastic pipe joints that are designed to withstand tensile forces, the procedure must be qualified by subjecting five specimen joints made according to the procedure to the following tensile test:

1) Use an apparatus for the test as specified in ASTM 0638-77 a (except for conditioning).

2) The specimen must be of such length that the distance between the grips of the apparatus and the end of the stiffener does not affect the joint strength.

3) The speed of testing is 5.0 mm (0.20 in.) per minute, plus or minus 25 percent.

4) Pipe specimens less than 102 mm (4 in.) in diameter are qualified if the pipe yields to an elongation of no less than 25 percent or failure initiates outside the joint area.

5) Pipe specimens 102 mm (4 in.) and larger in diameter shall be pulled until the pipe is subjected to a tensile stress equal to or greater than the maximum thermal stress that would be produced by a temperature change of 55° C (100° F) or until the pipe is pulled from the fitting. If the pipe pulls from the fitting, the lowest value of the five test results or the manufacturer's rating, whichever is lower must be used in the design calculations for stress.

6) Each specimen that fails at the grips must be retested using new pipe.

7) Results obtained pertain only to the specific outside diameter, and material of the pipe tested, except that testing of a heavier wall pipe may be used to qualify pipe of the same material but with a lesser wall thickness.

C. A copy of each written procedure being used for joining plastic pipe must be available to the persons making and inspecting joints.

D. Pipe or fitting manufactured before July 1, 1980, may be used in accordance with procedures that the manufacturer certified will produce a joint as strong as the pipe.

192.285 Plastic pipe; qualifying persons to make joints

A. No person may make a plastic pipe joint unless that person has been qualified under the applicable joining procedure by:

1) Appropriate training or experience in the use of the procedure; and

2) Making a specimen joint from pipe sections joined according to the procedure that passes the inspection and test set forth in paragraph (b) of this section. 8. The specimen joint must be:

1) Visually examined during and after assembly or joining and found to have the same appearance as a joint or photographs of a joint that is acceptable under the procedure; and

2) In the case of a heat fusion, solvent cement, or adhesive joint;

i) Tested under anyone of the test methods listed under 192.283(a) applicable to the type of joint and material being tested;

ii) Examined by ultrasonic inspection and found not to contain flaws that would cause failure; or

iii) Cut into at least 3 longitudinal straps, each of which is:

A. Visually examined and found not to contain voids or discontinuities on the cut surfaces of the joint area; and

B. Deformed by bending, torque, or impact, and if failure occurs, it must not initiate in the joint area.

C. A person must be re-qualified under an applicable procedure, if during any 12-month period that person:

1) Does not make any joints under that procedure; or

2) Has 3 joints or 3 percent of the joints made, whichever, is greater, under that procedure that are found unacceptable by testing under 192.513.

D. Each operator shall establish a method to determine that each person making joints in plastic pipelines in his system is qualified in accordance with this section.

192.287 Plastic pipe; inspection of joints

No person may carry out the inspection of joints in plastic pipes required by 192.273(c) and 192.285(b) unless that person has been qualified by appropriate training or experience in evaluating the acceptability of plastic pipe joints made under the applicable joining procedure.

192.311 Repair of plastic pipe

Each imperfection or damage that would impair the serviceability of plastic pipe must be repaired by a patching saddle or removed.

192.321 Installation of plastic pipe

A. Plastic pipe must be installed below ground level.

B. Plastic pipe that is installed in a vault or any other below grade enclosure must be completely encased in gas-tight metal pipe and fittings that are adequately protected from corrosion.

C. Plastic pipe that is not encased must have an electrically conductive wire or other means of locating the pipe while it is underground.

D. Plastic pipe that is being encased must be inserted into the casing pipe in a manner that will protect the plastic. The leading end of the plastic must be closed before insertion.

AMERICAN PETROLEUM INSTITUTE

STANDARD 1104

SECTION 2 QUALIFICATION OF WELDING PROCEDURES FOR WELDS CONTAINING FILLER-METAL ADDITIVES

2.1 PROCEDURE QUALIFICATION

Before production welding is started, a detailed procedure specification shall be established and qualified to demonstrate that welds with suitable mechanical properties (such as strength, ductility, and hardness) and soundness can be made by the procedure. The quality of the welds shall be determined by destructive testing. These procedures shall be adhered to except where a change is specifically authorized by the company, as provided for in 2.4.

2.2 RECORD

The details of each qualified procedure shall be recorded. The record shall show complete results of the procedure qualification test. These forms are listed in "Forms Section." The record shall be maintained as long as the procedure is in use.

2.3 PROCEDURE SPECIFICATION

2.3.1 GENERAL

The procedure specification shall include the information specified in 2.3.2.

2.3.2 SPECIFICATION INFORMATION

2.3.2.1 PROCESS

The specific process or combination of processes used shall be identified. The use of a manual, semiautomatic, or automatic welding process or any combination of these shall be specified.

2.3.2.2 PIPE AND FITTING MATERIAL

The materials to which the procedure applies shall be identified. API Specification 5L pipe, as well as materials that conform to acceptable ASTM specifications, may be grouped (see 2.4.2.2), provided that the qualification test is made on the material with the highest specified minimum yield strength in the group.

2.3.2.3 DIAMETERS AND WALL THICKNESSES

The ranges of diameters and wall thicknesses over which the procedure is applicable shall be identified. Examples of suggested groupings are given in 3.2.2, Items D and E.

2.3.2.4 JOINT DESIGN

The specification shall include a sketch or sketches of the joint that show the angle of bevel, the size of the root face, and the root opening or the space between abutting members. The shape and size of fillet welds shall be shown. If a backup is used, the type shall be designated.

2.4 ESSENTIAL VARIABLES

2.4.1 GENERAL

A welding procedure must be reestablished as a new procedure specification and must be completely re-qualified when any of the essential variables listed in 2.4.2 are changed. Changes other than those given in 2.4.2 may be made in the procedure without the need for re-qualification, provided the procedure specification is revised to show the changes.

2.4.2 CHANGES REQUIRING REQUALIFICATION

2.4.2.1 WELDING PROCESS OR METHOD OF APPLICATION

A change from the welding process or method of application established in the procedure specification (see 2.3.2.1) constitutes an essential variable.

2.4.2.2 PIPE MATERIAL

A change in pipe material constitutes an essential variable. For the purpose of this standard, all carbon steels shall be grouped as follows:

A. Specified minimum yield strength less than or equal to 42,000 pounds per square inch.

B. Specified minimum yield strength greater than 42,000 pounds per square inch but less than 65,000 pounds per square inch. For carbon steels with a specified minimum yield strength greater than or equal to 65,000 pounds per square inch, each grade shall receive a separate qualification test.

NOTE: The groupings specified in 2.4.2.2 do not imply that base materials or filler metals of different analyses within a group may be indiscriminately substituted for a material that was used in the qualification test without consideration of the compatibility of the base materials and filler metals from the standpoint of metallurgical and mechanical properties and requirements for pre- and post-heat treatment.

2.4.2.3 JOINT DESIGN

A major change in joint design (for example, from V groove to U groove) constitutes an essential variable. Minor changes in the angle of bevel or the land of the welding groove are not essential variables.

2.4.2.4 POSITION

A change in position from roll to fixed, or vice versa, constitutes an essential variable.

2.4.2.5 WALL THICKNESS

A change from one wall-thickness group to another constitutes an essential variable.

2.4.2.6 FILLER METAL

The following changes in filler metal constitutes essential variables:

A. A change from one filler-metal group to another (see Table 1)

B. For pipe materials with a specified minimum yield strength greater than or equal to 65,000 pounds per square inch, a change in the AWS classification of the filler metal. Changes in filler metal may be made within the groups specified in 2.4.2.2, Items A and B. The compatibility of the base material and the filler metal should be considered from the standpoint of mechanical properties.

Table 1: FILLER-METAL GROUPS

GROUP	AWS SPECIFICATION	ELECTRODE	FLUX
1	A5.1	E6010, E6011 E7010, E7011	
2	A5.5	E8010, E8011	
3	A5.1 or A5.5	E7015, E7016, E7018 E8015, E8016, E8018	
4[a]	A5.17	EL8 EL8K EL12 EM5K EM12K EM13K EM15K	F-60 F-61 F-62 F-70 F-71 F-72
B[b]	A5.18	ER70S-2	
6[b]	A5.18	ER70S-6	
7[b]	A5.28	ER80S-D2	
8	A5.2	RG60, RG65	

NOTE: Other electrodes, filler metals, ana fluxes may be used but require separate procedure qualification.

a. Any combination of flux and electrode in group 4 may be used to qualify a procedure. The combination shall be identified by its complete AWS classification number, such as F71-EL 12 or F62-EM12K. Only substitutions that result in the same AWS classification number are permitted without re-qualification.

b. A shielding gas shall be used with electrodes in group 5, 6, and 7.

2.4.2.7 ELECTRICAL CHARACTERISTICS

A change from DC electrode positive to DC electrode negative or vice versa or a change in current from DC to AC or vice versa constitutes an essential variable.

2.4.2.8 TIME BETWEEN PASSES

An increase in the maximum time between completion of the root bead and the start of the second bead constitutes an essential variable.

2.4.2.9 DIRECTION OF WELDING

A change in the direction of welding from vertical downhill to vertical uphill, or vice versa, constitutes an essential variable.

2.4.2.10 SHIELDING GAS AND FLOW RATE

A change from one shielding gas to another or from one mixture of gases to another constitutes an essential variable.

A major increase or decrease in the range of flow rates for the shielding gas also constitutes an essential variable.

2.5 WELDING OF TEST JOINTS BUTT WELDS

To weld the test joints for butt welds, two pipe nipples shall be joined, following all details of the procedure specification.

2.6 TESTING OF WELDED JOINTS BUTT WELD

2.6.1 PREPARATION

To test butt-welded joint, test specimens shall be cut from the joint. The specimens shall be prepared. For pipe less than 2- 3/8" in diameter, two test welds shall be made to obtain the required number of test specimens. The specimens shall be air cooled to ambient temperature before being tested.

2.6.2.2 METHOD

The tensile strength test specimens shall be broken under tensile load, using equipment capable of measuring the load at which failure occurs. The tensile strength shall be computed by dividing the maximum load at failure by the smallest cross-sectional area of the specimen, as measured before the load is applied.

2.6.2.3 REQUIREMENTS

The tensile strength of the weld, including the fusion zone of each specimen, shall be greater than or equal to the specified minimum tensile strength of the pipe material but need not be greater than or equal to the actual tensile strength of the material. If the specimen breaks outside the weld and fusion zone (that is, the parent pipe material) and meets the minimum tensile-strength requirements of the specification, the weld shall be accepted as meeting the requirements.

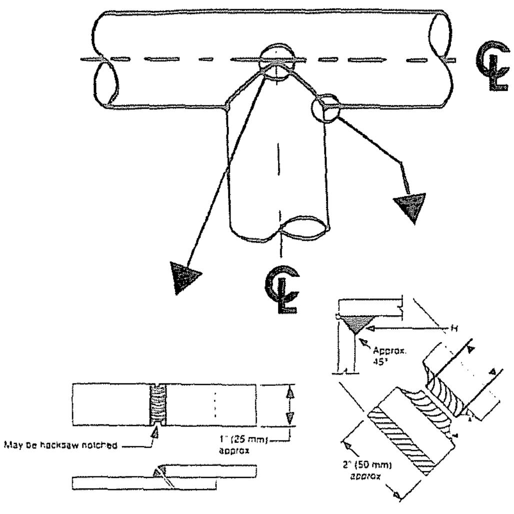
If the specimen breaks in the weld or fusion zone and the observed strength is greater than or equal to the specified minimum tensile strength of the pipe material and meets the soundness requirements of 2.6.3.3, the weld shall be accepted as meeting the requirements.

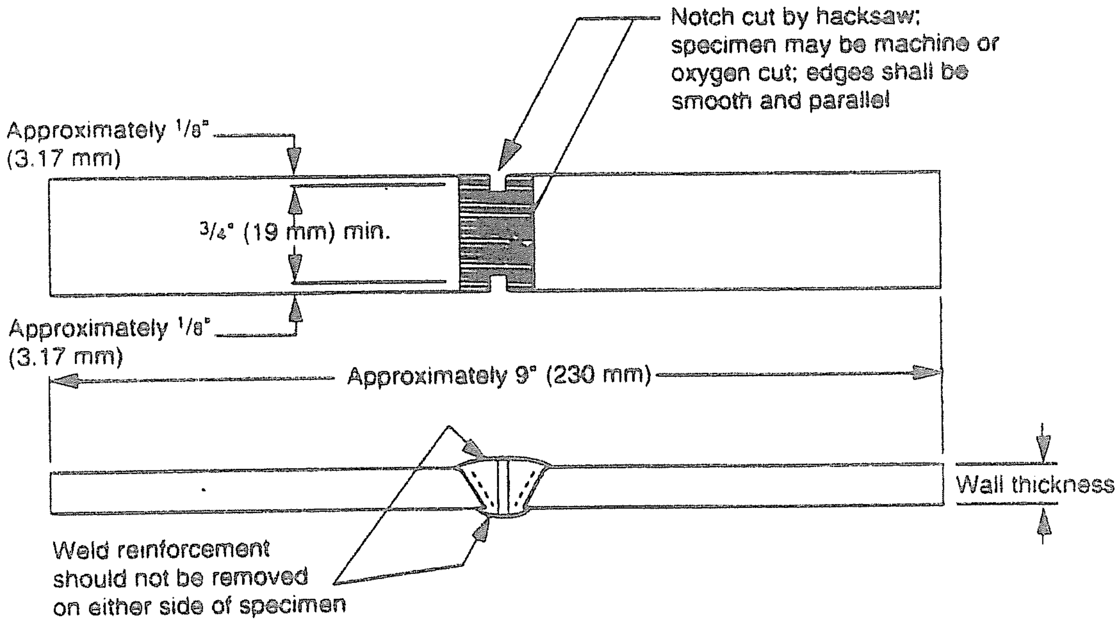
If the specimen breaks below the specified minimum tensile strength of the pipe material, the weld shall be set aside and a new test shall be made.

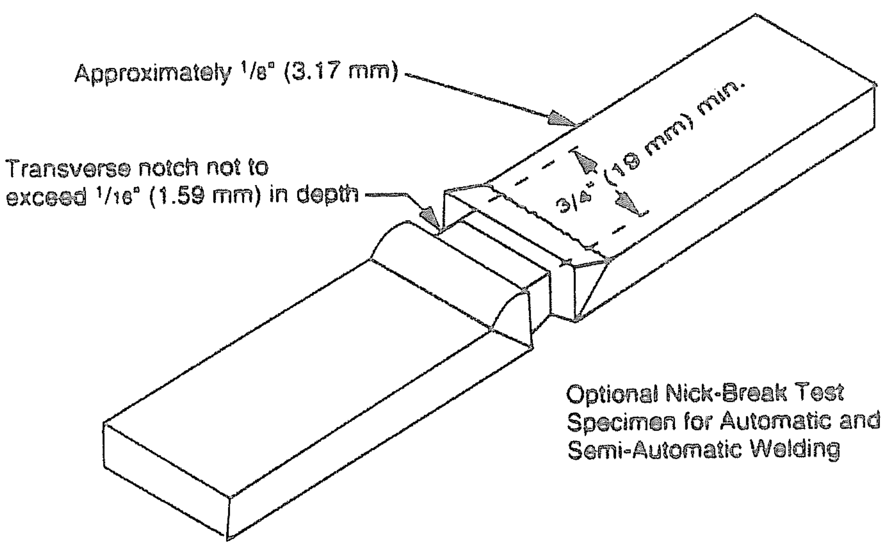
2.6.3 NICK-BREAK TEST

2.6.3.1 PREPARATION

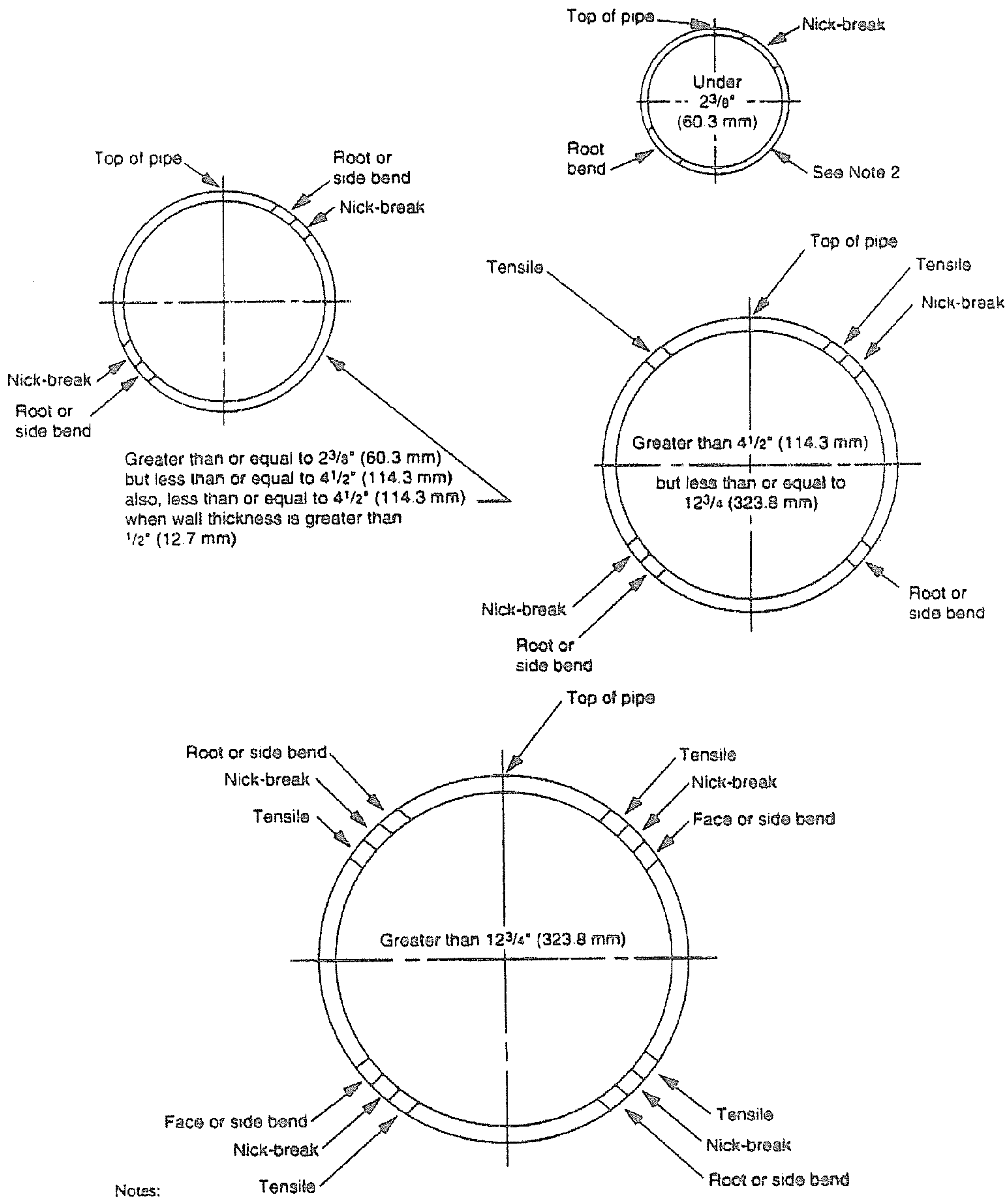
The nick break test specimens shall be approximately 9. long and approximately 1. wide and may be machine cut or oxygen cut. They shall be notched with a hacksaw on each side at the center of the weld, and each notch shall be approximately 1/8" deep.







Optional Nick-Break Test Specimen for Automatic and Semi-Automatic Welding



Notes:

1. At the company's option, the locations may be rotated, provided they are equally spaced around the pipe; however, specimens shall not include the longitudinal weld.
2. One full-section tensile-strength test specimen may be used for pipe with a diameter less than or equal to 1 5/16 inch (33.4 millimeters).

When previous testing experience indicates that failures through the pipe can be expected, the external reinforcement may be notched to a depth of not more than 1/16", measured from the original weld surface.

2.6.3.2 METHOD

The nick break specimens shall be broken by pulling in a tensile machine, by supporting the ends and striking the center, or by supporting one end and striking the other end with a hammer. The exposed area of the fracture shall be at least 3/4" wide.

2.6.3.3 REQUIREMENTS

The exposed surfaces of each nick break specimen shall show complete penetration and fusion. The greatest dimension of any gas pocket shall not exceed 1/16", and the combined area of all gas pockets shall not exceed 2 percent of the exposed surface area. Slag inclusions shall not be more than 1/32" in depth and shall not be more than 1/8" or one-half the nominal wall thickness in length, whichever is smaller. There shall be at least 1-1/4" of sound weld metal between adjacent slag inclusions.

2.6.4 ROOT AND FACE BEND TEST

2.6.4.1 PREPARATION

The root and face bend test specimens shall be approximately 9" long and approximately 1" wide, and their long edges shall be rounded. They may be machine cut or oxygen cut. The cover and root bead reinforcement shall be removed flush with the surfaces of the specimen. These surfaces shall be smooth, and any scratches that exist shall be light and transverse to the weld.

2.6.4.2 METHOD

The root and face bend specimens shall be bent in a guided bend test jig. Each specimen shall be placed in the die with the weld at mid-span. Face bend specimens shall be placed with the face of the weld toward the gap, and the root bend specimens shall be placed with the root of the weld toward the gap. The plunger shall be forced into the gap until the curvature of the specimen is approximately U shaped.

2.6.4.3 REQUIREMENTS

The bend test shall be considered acceptable if no crack or other defect exceeding 1/8" or one-half the nominal wall thickness, whichever is smaller, in any direction is present in the weld or between the weld and the fusion zone after bending. Cracks that originate on the outer radius of the bend along the edges 1/4", measured in any direction, shall not be considered unless obvious defects are observed. Each specimen subjected to the bend test shall meet these requirements.

2.8 TESTING OF WELDED JOINTS FILLET WELDS

2.8.1 PREPARATION

To test the fillet welded joint, test specimens shall be cut from the joint. At least four specimens shall be taken and prepared. The specimens may be machine cut or oxygen cut. They should be at least 1- wide and long enough so that they can be broken in the weld. The specimens shall be air cooled to ambient temperature before testing.

2.8.2 METHOD

The fillet weld specimens shall be broken in the weld by any convenient method.

2.8.3 REQUIREMENTS

The exposed surfaces of each fillet weld specimen shall show complete penetration and fusion, and (a) the greatest dimension of any gas pocket shall not exceed 1/16", (b) the combined area of all gas pockets shall not exceed 2 percent of the exposed surface area, (c) slag inclusions shall not be more than 1-3/8" in depth and shall not be more than 1/8" or one-half the nominal wall thickness in length, whichever is smaller, and (d) there shall be at least 1/2" of sound weld metal between adjacent inclusions. The dimensions should be measured.

SECTION 3 - QUALIFICATION OF WELDERS

3.1 GENERAL

The purpose of the welder qualification test is to determine the ability of welders to make sound butt or fillet welds using previously qualified procedures. Before any production welding is performed, welders shall be qualified according to the applicable requirements of 3.2 through 3.8. It is the intent of this standard that a welder who satisfactorily completes the procedure qualification test is a qualified welder.

Before starting the qualification tests, the welder shall be allowed reasonable time to adjust the welding equipment to be used. The welder shall use the same welding technique and proceed with the same speed he/she will use if he/she passes the test and is permitted to do production welding. The qualification of welders shall be conducted in the presence of a company representative.

A welder shall qualify for welding by performing a test on segments of pipe nipples or on full-size pipe nipples, as specified in 3.2.1. When segments of pipe nipples are used, they shall be supported so that typical flat, vertical, and overhead welds are produced.

The essential variables associated with procedure and welder qualifications are not identical. The essential variables for welder qualification are specified in 3.2.2 and 3.3.2.

3.2 SINGLE QUALIFICATION

3.2.1 GENERAL

For single qualification, a welder shall make a test weld, using a qualified procedure to join pipe nipples or segments of pipe nipples. The welder shall make a butt weld in either the rolled or the fixed position. When the welder is qualifying in the fixed position, the axis of the pipe shall be in the horizontal plane, in the vertical plane, or inclined from the horizontal plane at an angle of not more than 45 degrees.

A welder making a single-qualification test for branch connections, fillet welds, or other similar configurations shall follow the specific procedure specification and shall be limited to the range specified in the procedure specification.

Changes in the essential variables described in 3.3.2 require re-qualification of the welder.

The weld shall be acceptable if it meets the requirements of 3.4 and either 3.5 or 3.6.

3.2.2 SCOPE

A welder who has successfully completed the qualification test described in 3.2.1 shall be qualified within the limits of the essential variables described below. If any of the following essential variables are changed, the welder using the new procedure shall be re-qualified:

A. A change from one welding process to another welding process or combination of processes.

B. A change in the direction of welding from vertical uphill to vertical downhill or vice versa.

C. A change of filler-metal classification from Group 1 or 2 to Group 3 or from Group 3 to Group 1 or 2.

D. A change from one outside-diameter group to another. These groups are defined as follows:

1. Outside diameter less than 2-3/8"

2. Outside diameter greater than 12-3/4"

E. A change from one wall-thickness group to another. These groups are defined as follows:

1. Nominal pipe wall thickness less than 3/16".

2. Nominal pipe wall thickness from 3/16" through 3/4".

3. Nominal pipe wall thickness greater than 3/4".

F. A change in position from that which the welder has already qualified (for example, a change from rolled to fixed or a change from vertical to horizontal or vice versa). A welder who successfully passes a but-weld qualification test in the fixed position with the axis inclined 45 degrees from the horizontal plane shall be qualified to do butt welds in all positions.

G. A change in the joint design (for example, the use of a backing strip or a change from V bevel to U bevel).

3.3 MULTIPLE QUALIFICATION

3.3.1 GENERAL

For multiple qualification, a welder shall successfully complete the two test described below, using qualified procedures.

For the first test, the welder shall make a butt weld in the fixed position with the axis of the pipe either in the horizontal plane or inclined from the horizontal plane at 45 degrees. This butt weld shall be made on pipe whose diameters at least 6-5/8" and whose wall thickness is at least 1/4" without a backing strip.

The weld shall be acceptable if it meets the requirements of 3.4 and either 3.5 or 3.6. Specimens may be removed from the test weld, or they may be selected at the relative locations but without reference to the top of the pipe, or they may be selected from locations that are equidistantly spaced around the entire pipe circumference.

The sequence of adjacent specimen types shall be identical for various pipe diameters. For the second test, the welder shall layout, cut, fit, and weld a full-size branch-on-pipe connection. This test shall be made with pipe whose diameter is at least 6-5/8" and whose nominal wall thickness is at least 1/4". A full-size hole shall be cut in the run. The weld shall be made with the run-pipe axis in the horizontal position and the branch-pipe axis extending vertically downward from the run. The finished weld shall exhibit a neat, uniform workman appearance.

The weld shall exhibit complete penetration around the entire circumference. Completed root beads shall not contain any burn-through of more than 1/4".

The sum of the maximum dimensions of separate unrepaired burn-throughs in any continuous 12-inch length of weld shall not exceed ½".

Four nick-break specimens shall be removed from the weld at the specified locations. They shall be prepared and tested in accordance with 2.8.1 and 2.8.2. The exposed surfaces shall meet the requirements of 2.8.3.

3.3.2 SCOPE

A welder who has successfully completed the butt weld qualification test described in 3.3.1 on pipe whose diameter is greater than or equal to 12-3/4" and a full-size branch connection weld on pipe whose diameter is greater than

or equal to 12-3/4" shall be qualified to weld in all positions; on all wall thicknesses, joint designs, and fittings; and on all pipe diameters. A welder who has successfully completed the butt weld and branch connection requirements

of 3.3.1 on pipe whose diameter is less than 12-3/4" shall be qualified to weld in all positions; on all wall thicknesses, joint designs, and fittings; and on all pipe diameters less than or equal to the diameter used by the welder in the qualification tests.

If any of the following essential variables are changed in a procedure specification, the welder using the new procedure shall be requalified:

A. A change from one welding process to another welding process or combination of processes.

B. A change in the direction of welding from vertical uphill to vertical downhill, or vice versa.

C. A change of filler-metal classification from Group 1 or 2 to Group 3 or from Group 3 to Group 1 or 2. 3.4.

VISUAL EXAMINATION

For a qualification test weld to meet the requirements for visual examination, the weld shall be free from cracks (see 6.3.9), inadequate penetration (see 6.3.1 and 6.3.2), burn-through (see 6.3.6), and other defects (see section 6)

and must present a neat workmanlike appearance. Undercutting adjacent to the final bead on the outside of the pipe shall not be more than 1/32" deep or 12.5 percent of the pipe wall thickness, whichever is smaller, and there shall not be more than 2. of undercutting in any continuous 12-inch length of weld.

Failure to meet the requirements of this subsection shall be adequate cause to eliminate additional testing.

3.5 DESTRUCTIVE TESTING

3.5.1 SAMPLING OF TEST BUTT WELDS

To test butt welds, samples shall be cut from each test weld. The locations from which the specimens are to be removed if the test weld is a complete circumferential weld shall be dictated by the standard 2/4/8/10 positions. If the test weld consists of segments of pipe nipples, an approximately equal number of specimens shall be removed from each segment. The specimens shall be air cooled to ambient temperature before testing.

For pipe with a diameter less than or equal to 1-5/16", one full-pipe-section specimen may be substituted for the root-bend and nick-break specimens. This full-section specimen shall be tested in accordance with 2.6.2.2 and shall meet the requirements of 3.5.3.

3.5.2 TENSILE-STRENGTH, NICK-BREAK, AND BEND TEST PROCEDURES FOR

BUTT WELDS

The specimens shall be prepared for tensile-strength. nick-break, and bend test, and shall be performed as described in 2.4. The tensile-strength test may be omitted, in which case the specimens designated for this test shall be subjected to the nick-break test.

3.5.3 TENSILE-STRENGTH TEST

REQUIREMENTS FOR BUTT WELDS

For the tensile-strength test, if two or more of the reduced-section specimens or the full-section specimen breaks in the weld or at the junction of the weld and the parent metal and fails to meet the soundness requirements of 2.6.3.3, the welder shall be disqualified.

3.5.4 NICK-BREAK TEST

REQUIREMENTS FOR BUTT WELDS

For the nick-break test, if any specimen shows discontinuities, excluding fish eyes, that exceed those allowed by 2.6.3.3, the welder shall be disqualified.

3.5.5 BEND TEST

REQUIREMENTS FOR BUTT WELDS

For the bend tests, if any specimen shows defects that exceed those allowed by 2.6.4.3 or 2.6.5.3, the welder shall be disqualified. Welds in high-test pipe may not bend to the full U shape. These welds shall be considered acceptable if the specimens that crack are broken apart and their exposed surfaces meet the requirements of 2.6.3.3.

If one of the bend test specimens fails to meet these requirement and, in the company's opinion, the lack of penetration observed is not representative of the weld, the test specimen may be replaced by an additional specimen cut adjacent to the one that failed. The welder shall be disqualified if the additional specimen also shows defects that exceed the specified lim its.

3.5.6 SAMPLING OF TEST FILLET WELDS

To test fillet welds, specimens shall be cut from each test weld. Locations from which the specimens are to be removed if the test weld is a complete circumferential weld. If the test weld consists of segment of pipe nipples, an approximately equal number of specimens shall be removed from each segment. The specimens shall be air cooled to ambient temperature before testing.

3.5.7 TEST METHOD AND REQUIREMENTS FOR FILLET WELDS

The fillet-weld specimens shall be prepared and the test shall be performed as described in 2.8.

3.6 RADIOGRAPHY - BUTT WELDS ONLY

3.6.1 GENERAL

A company may request, the qualification butt weld be examined by radiography in lieu of the tests specified in 3.5.

3.6.2 INSPECTION REQUIREMENTS

Radiographs shall be made of each of the test welds. The welder shall be disqualified if any of the test welds do not meet the requirements of 6.3.

Radiographic inspection shall not be used for the purpose of locating sound areas or areas that contain discontinuities and subsequently making tests of such areas to qualify or disqualify a welder.

3.7 RETESTING

If, in the mutual opinion of the company and the contractor's representatives, a welder fails to pass the qualification test because of unavoidable conditions or conditions beyond his/her control, the welder may be given a second opportunity to qualify. No further retests shall be given until the welder has submitted proof of subsequent welder training that is acceptable to the company. If no proof of further training is obtained, the minimum re-testing period shall not be greater than 30 days before re-testing.

3.8 RECORDS

A record shall be made of the tests given to each welder and of the detailed results of each test. Forms have been created to meet the individual qualifying test performed. A list of qualified welders and the procedures for which they are qualified shall be maintained and shall be referred too as the Continuity Log. This log shall be maintained by the testing firm performing the certification testing. A welder may be required to requalify if a question arises about his/her competence. The burden of enforcement shall rest upon the regulatory inspectors.

SECTION 6 ACCEPTANCE STANDARDS

6.1 GENERAL

The acceptance standards presented in this section apply to discontinuities located by radiographic, magnetic particle, liquid penetrant, and ultrasonic test methods. They may also be applied to visual inspection. Nondestructive testing shall not be used to select welds that are subjected to destructive testing in accordance with 5.1.

6.2 RIGHTS OF REJECTION

All nondestructive test methods are limited in the information that can be derived from the indications they produce. The company may therefore reject any weld that appears to meet these acceptance standards if, in its opinion, the depth of a discontinuity may be detrimental to the weld.

6.3 RADIOGRAPHIC TESTING

NOTE: All densities referred to in 6.3.1 through 6.3.12 are based on negative images. Sensitivity shall be based on a minimum of 6 pin identification.

6.3.1 INADEQUATE PENETRATION

Inadequate Penetration without high-low (IP) is defined as the incomplete filling of the weld root. IP shall be unacceptable when any of the following conditions exist:

A. The length of an individual indication of IP exceeds 1 inch.

B. The aggregate length of indications of IP in any continuous 12 inch length of weld exceeds 1 inch.

C. The aggregate length of indications of IP exceeds 8 percent of the weld length in any weld less than 12 inches in length.

6.3.2 INADEQUATE PENETRATION DUE TO HIGH-LOW

Inadequate penetration due to high-low (IPD) is defined as the condition that exists when one edge of the root is exposed (or unbonded) because adjacent pipe or fitting joints are misaligned. This condition is unacceptable when any of the following conditions exists:

A. The length of an individual indication of IPD exceeds 2 inches.

B. The aggregate length of indications of IPD in any continuous 12 inch

length of weld exceeds 3 inches.

6.3.3 INCOMPLETE FUSION

Incomplete fusion (IF) is defined as a discontinuity between the weld metal and the base metal that is open to the surface. This condition shall be unacceptable when any of the following conditions exists:

A. The length of an individual indication of IF exceeds 1 inch.

B. The aggregate length of indications of IF in any continuous 12-inch length of weld exceeds 1 inch.

C. The aggregate length of indications of IF exceeds 8 percent of the weld length in any weld less than 12 inches in length.

6.3.4 INCOMPLETE FUSION DUE TO COLD LAP

Incomplete fusion due to cold lap (IFD) is defined as a discontinuity between two adjacent weld beads or between the weld metal and the base metal that is not open to the surface. This condition shall be unacceptable when any of the following conditions exists:

A. The length of an individual indication of IFD exceeds 2 inches.

B. The aggregate length of indications of IFD in any continuous 12-inch length of weld exceeds 2 inches.

C. The aggregate length of indications of IFD exceeds 8 percent of the weld length.

6.3.5 INTERNAL CONCAVITY

Internal concavity (IC) is acceptable, provided the density of the radiographic image of the IC does not exceed that of the thinnest adjacent base metal. For areas that exceed the density of the thinnest adjacent base metal, the criteria for bum-through are applicable.

6.3.6 BURN-THROUGH

6.3.6.1 A burn-through (BT) is defined as a portion of the root bead where excessive penetration has caused the weld to be blown into the pipe. 6.3.6.2 For pipe with an outside diameter greater than or equal to 2-3/8 inches, a BT shall be unacceptable when any of the following conditions exists:

A. The maximum dimension exceeds 1/4 inch and the density of the BT's image exceeds that of the thinnest adjacent base metal.

B. The maximum dimension exceeds the thinner of the nominal wall thickness joined, and the density of the BT's image exceeds that of the thinnest adjacent base metal.

C. The sum of the maximum dimensions of separate BT's whose image density exceeds that of the thinnest adjacent base metal exceeds ½ inch in any continuous 12 inch length of weld or the total weld length, whichever is less. 6.3.6.3 For pipe with an outside diameter less than 2-3/8 inches, a BT shall be unacceptable when any of the following conditions exists:

A. The maximum dimension exceeds 1/4 inch and the density of the BT's image exceeds that of the thinnest adjacent base metal.

B. The maximum dimension exceeds the thinner of the nominal wall thickness joined, and the density of the BT's image exceeds that of the thinnest adjacent base metal.

C. More than one BT of any size is present and the density of more than one of the images exceeds that of the thinnest adjacent base metal.

6.3.7 SLAG INCLUSIONS

6.3.7.1 A slag inclusion is defined as a nonmetallic solid entrapped in the weld or between the weld metal and the pipe metal. Elongated slag inclusions (Esls)-for example, continuous or broken slag lines or wagon tracks- are usually found at the fusion zone. Isolated slag inclusions are irregularly shaped and may be located anywhere in the weld. For evaluation purposes, when the size of a radiographic indication of slag is measured, the indication's maximum dimension shall be considered its length. 6.3.7.2 For pipe with an outside diameter greater than or equal to 2-3/8 inches, slag inclusions shall be unacceptable when any of the following conditions exists:

A. The length of an ESI indication exceeds 2 inches.

NOTE: Parallel ESI indications separated by approximately the width of the root bead (wagon tracks) shall be considered a single indication unless the width of either of them exceeds 1/32 inch. In that event, they shall be considered separate indications.

B. The aggregate length of ESI indications in any continuous 12-inch length of weld exceeds 2 inches.

C. The width of an ESI indication exceeds 1/16 inch.

D. The aggregate length of 151 indications in any continuous 12-inch length of weld exceeds 1/2 inch.

E. The width of an 151 indication exceeds 1/8 inch.

F. More than four 151 indications with the maximum width of 1/8 inch.

G. The aggregate length of ESI and ISI indications exceeds 8 percent of the weld length. 6.3.7.3 For pipe with an outside diameter less than 2-3/8 inches, slag inclusions shall be unacceptable when any of the following conditions exists:

A. The length of an ESI indication exceeds three times the thinner of the nominal wall thickness joined.

NOTE: Parallel ESI indications separated by approximately the width of the root bead (wagon tracks) shall be considered a single indication unless the width of either of them exceeds 1/32 inch. In that event, they shall be considered separate indications.

B. The width of an ESI indication exceeds 1/16 inch.

C. The aggregate length of ISI indications exceeds two times the thinner of the nominal wall thickness joined and the width exceeds one-half the thinner of the nominal wall thicknesses joined.

D. The aggregate length of ESI and ISI indications exceeds 8 percent of the weld length.

6.3.8 POROSITY

6.3.8.1 Porosity is defined as gas trapped by solidifying weld metal before the gas has a chance to rise to the surface of the molten puddle and escape. Porosity is generally spherical but may be elongated or irregular in shape, such as piping (wormhole) porosity. When the size of the radiographic indication produced by a pore is measured, the maximum dimension of the indication shall apply to the criteria given in 6.3.8.2 and 6.3.8.4. /6.3.8.2 Individual or scattered porosity (P) shall be unacceptable when any of the following conditions exists:

A. The size of an individual pore exceeds 1/8 inch.

B. The size of an individual pore exceeds 25 percent of the thinner of the nominal wall thickness joined.

C. The distribution of the scattered porosity exceeds the concentration permitted by 6.3.8.3 Cluster porosity (CP) that occurs in any pass except the finish pass shall comply with the criteria of 6.3.8.2. CP that occurs in the finish pass shall be unacceptable when any of the following conditions exists:

A. The diameter of the cluster exceeds 1/2 inch.

B. The aggregate length of CP in any continuous 12-inch length of weld exceeds 1/2 inch.

C. An individual pore within a cluster exceeds 1/16 inch in size. 6.3.8.4 Hollow-bead porosity (HB) is defined as elongated linear porosity that occurs in the root pass. HB shall be unacceptable when any of the following conditions exists:

A. The length of an individual indication of HB exceeds 1/2 inch.

B. The aggregate length of indications of HB in any continuous 12-inch length of weld exceeds 2 inches.

C. Individual indications of HB, each greater than 1/4 inch in length, are separated by less than 2 inches.

D. The aggregate length of all indications of HB exceeds 8 percent of the weld length.

6.3.9 CRACKS

Cracks (C) shall be unacceptable when any of the following conditions exists:

A. The crack, of any size or location in the weld, is not a shallow crater or star crack.

B. The crack is a shallow crater crack or star crack whose length exceeds 5/32 inch.

NOTE: SHALLOW CRATER CRACKS OR STAR CRACKS ARE LOCATED AT THE STOPPING POINT OF WELD BEADS AND ARE THE RESULT OF WELD METAL CONTRACTIONS DURING SOLIDIFICATION.

6.3.10 UNDERCUTTING

Undercutting is defined as a groove melted into the base metal adjacent to the toe or root of the weld and left unfilled by weld metal. Undercutting adjacent to the cover pass (EU) or root pass (IU) shall be unacceptable when any of the following conditions exists:

A. The aggregate length of indications of EU and IU, in any combination, in any continuous 12-inch length of weld exceeds 2 inches.

B. The aggregate length of indications of EU and IU, in any combination, exceeds one-sixth of the weld length.

NOTE: See 6.7 for acceptance standards for undercutting when visual and mechanical measurements are employed.

6.3.11 ACCUMULATION OF DISCONTINUITIES

Excluding incomplete penetration due to high-low and undercutting, any accumulation of discontinuities (AD) shall be unacceptable when any of the following conditions exists:

A. The aggregate length of indications in any continuous 12-inch length of weld exceeds 2 inches.

B. The aggregate length of indications exceeds 8 percent of the weld length.

6.3.12 PIPE OR FITTING DISCONTINUITIES

Arc bums, long seam discontinuities, and other discontinuities in the pipe or fittings detected by radiographic testing shall be reported to the responsible party owning the qualification. Their disposition by repair or removal shall be as directed by the company providing the testing.

QUALIFICATION OF WELDERS

All welder qualification tests will be conducted in accordance with this specification and appropriate codes and regulations as maybe called for.

All welders performing welding on any natural gas transmission or distribution line shall be qualified to perform such welding under Subpart E, 192.221-192.243 of the U. S. Department Of Transportation Pipeline Safety Regulations as of January 6, 2010, and American Petroleum Institute;

Welding of Pipelines and Related Facilities, Standard 1104, Sections 2, 3 and 6, 20th Edition, API Std 1104, Errata 2.2008.

Oxygen-acetylene welders will be qualified under Appendix C, sections I. II, and III. qualification of welders of low stress level pipe as prescribed in D. O. T. Pipeline Safety Regulations.

Manual arc welders will be qualified under Appendix C, in section IV and V, qualification of welders of low stress level pipe as prescribed in D. O. T. Pipeline Safety Regulations.

Multiple Qualification, (COMBINATION WELDERS) will be qualified under D. O. T. Pipeline Safety Regulations part 192.227; A, and API Standard 1104 section 3.3.1. Appendix C Qualification for Welders of Low Stress Level Pipe Manual Arc Welding

I. Basic Test. The test is made on pipe 12 inches or less in diameter. The test weld must be made with the pipe in a horizontal fixed position so that the test weld includes at least one section of overhead position welding. The root opening, beveling, and other details must conform to the specifications of the procedure under which the welder is being qualified. The cap pass must be no more than 1/16. wider than the weld groove on both sides. Upon completion, the test weld is cut into four coupons and subjected to a root bend test. If, as a result of this test, two or more of the four coupons develop a crack in the weld material, or between the weld material and base metal, that is more than 1/8 inch long in any direction, the weld is unacceptable. Cracks that occur on the corner of the specimen during testing are not considered. See API Standard 1104 section 3.4 for additional qualifications.

II. Additional tests for welders of service line connections to mains. A service line connection fitting is welded to a pipe section with the same diameter as a typical main. The weld is made in the same position as it is made in the field. The weld is unacceptable if it shows a serious undercutting or if it has rolled (cold) edges. The weld is then air tested with the use of a soap solution, if there is a leak the weld is unacceptable. The weld is then tested by attempting to break the fitting off of the run of pipe. The weld is unacceptable if it breaks and shows incomplete fusion, overlap, or poor penetration at the junction of the fitting and main.

III. Periodic tests for welders of small service lines. Two samples of the welder's work, each about 8 inches long with the weld located approximately in the center, are cut from steel service line and tested as follows:

1. one sample is centered in a guided bend testing machine and bent to the contour of the die for a distance of 2 inches on each side of the weld. If the sample shows any breaks or cracks after removal from the bending machine, it is unacceptable.

Appendix C Manual Arc-Qualification for Welders of Low Stress Level Pipe Oxygen-Acetylene Welding

IV. Basic Test. The test is made on pipe 12 inches or less in diameter. The test weld must be made with the pipe in a horizontal fixed position so that the test weld includes at least one section of overhead position welding. The root opening, beveling, and other details must conform to the specifications of the procedure under which the welder is being qualified. The finished weld bead (cap pass), must not be more than 3/32" beyond the weld groove on either side. Upon completion, the test weld is cut into four coupons and subjected to a root bend test. If, as a result of this test, two or more of the four coupons develop a crack in the weld material, or between the weld material and base metal, that is more than 1/8 inch long in any direction, the weld is unacceptable. Cracks that occur on the corner of the specimen during testing are not considered.

See API Standard 1104 section 3.4 for additional qualifications.

V. Additional tests for welders of service line connections to mains. A service line connection fitting is welded to a pipe section with the same diameter as a typical main. The weld is made in the same position as it is made in the field. The weld is unacceptable if it shows a serious undercutting or if it has rolled (cold) edges.

The weld must also show only one visible pass and must demonstrate a neat workmanship appearance. The weld is then air tested with the use of a soap solution, if there is a leak the weld is unacceptable. The weld is then tested by attempting to break the fitting off of the run of pipe. The weld is unacceptable if it breaks and shows incomplete fusion, overlap, or poor penetration at the junction of the fitting and main.

Multiple Qualification

VI. Combination Welders will be qualified under API Standard 1104 paragraph 3.3.1, Standard for Welding Pipe Lines and Related Facilities. For multiple qualification, a welder shall successfully complete the two test described below, using qualified procedures. The welder shall make a butt weld in the fixed position with the axis of the pipe either in the horizontal plane or inclined from the horizontal plane at 45 degrees. This butt weld shall be made on pipe whose diameters at least 6-5/8" and whose wall thickness is at least 1/4" without a backing strip. The weld shall be acceptable if it meets the requirements of 3.4 and either 3.5 or 3.6. Specimens may be removed from the test weld at the locations selected at the relative locations without reference to the top of the pipe, or they may be selected from locations that are equidistantly spaced around the entire pipe circumference. The sequence of adjacent specimen types shall be identical for various pipe diameters.

VII. The welder shall lay out, cut, fit, and weld a full-size saddle-on/saddle-in pipe connection. This test shall be made with pipe whose diameter is at least 6-5/8" and whose nominal wall thickness is at least 1/4". A full-size hole shall be cut in the run. The weld shall be made with the run-pipe axis in the horizontal position and the branch-pipe axis extending vertically downward from the run. The finished weld shall exhibit a neat, uniform workman appearance the weld shall exhibit complete penetration around the entire circumference. Completed root beads shall not contain any bum-through of more than 1/4". The sum of the maximum dimensions of separate unrepaired burn-throughs in any continuous 12-inch length of weld shall not exceed ½". Four nick-break specimens shall be removed from the weld at the proper locations and prepared and tested in accordance with 2.8.1 and 2.8.2. The exposed surfaces shall meet the requirements of 2.8.3. Four nick-break specimens shall be selected from the weld and tested and shall meet the requirements of section 2.6.3.3 of the API Standard 1104.

3.3.2 Scope of Multiple Qualification

A welder who has successfully completed the butt weld qualification test described in 3.3.1 on pipe whose diameter is greater than or equal to 12-3/4" and a full-size branch connection weld on pipe whose diameter is greater than or equal to 12-3/4" shall be qualified to weld in all positions; on all wall thicknesses, joint designs, and fittings; and on all pipe diameters. A welder who has successfully completed the butt weld and branch connection requirements of 3.3.1 on pipe whose diameter is less than 12-3/4" shall be qualified to weld in all positions; on all wall thicknesses, joint designs, and fittings; and on all pipe diameters less than or equal to the diameter used by the welder in the qualification tests. If any of the following essential variables are changed in a procedure specification, the welder using the new procedure shall be re-qualified:

A. A change from one welding process to another welding process or combination of processes.

B. A change in the direction of welding from vertical uphill to vertical downhill, or vice versa.

C. A change of filler-metal classification from Group 1 or 2 to Group 3 or from Group 3 to Group 1 or 2.

DEPARTMENT

OF

TRANSPORTATION

APPENDIX "C"

QUALIFICATION OF WELDERS FOR LOW STRESS LEVEL PIPE

I. Basic Test. The test is made on pipe 12 inches or less in diameter. The test weld must be made with the pipe in a horizontal fixed position so that the test weld includes at least one section of overhead position welding. The root opening, beveling, and other details must conform to the specifications of the procedure under which the welder is being qualified. Upon completion, the test weld is cut into four coupons and subjected to a root bend test. If, as a result of this test, two or more of the four coupons develop a crack in the weld material, or between the weld material and base metal, that is more than 1/8 inch long in any direction, the weld is unacceptable. Cracks that occur on the corner of the specimen during testing are not considered.

II. Additional tests for welders of service line connections to mains. A service line connection fitting is welded to a pipe section with the same diameter as a typical main. The weld is made in the same position as it is made in the field. The weld is unacceptable if it shows a serious undercutting or if it has rolled edges. The weld is then tested by attempting to break the fitting off of the run of pipe. The weld is unacceptable if it breaks and shows incomplete fusion, overlap, or poor penetration at the junction of the fitting and main.

III. Periodic tests for welders of small service lines. Two samples of the welder's work, each about 8 inches long with the weld located approximately in the center, are cut from steel service line and tested as follows:

1. One sample is centered in a guided bend testing machine and bent to the contour of the die for a distance of 2 inches on each side of the weld. If the sample shows any breaks or cracks after removal from the bending machine, it is unacceptable.

2. The ends of the second sample are flattened and the entire joint subjected to a tensile strength test. If failure occurs adjacent to or in the weld metal, the weld is unacceptable. If a tensile strength testing machine is not available, this sample must also pass the bending test prescribed in subparagraph (1) of this paragraph.

MANUAL OF APPROVED PROCEDURES FOR OPERATIONS WELDING AND CUTTING SAFETY

I. GENERAL

This Supplement shall be adhered to for the protection of persons from injury and illness, and property from damage, by fire and other causes arising from electric and gas welding and cutting operations.

II. PRECAUTIONS TO AVOID EXPLOSIONS OF GAS-AIR MIXTURES

Operations such as gas or electric welding and cutting can be safely performed on pipelines if they are completely full of gas or if the pipeline is completely full of gas during the welding or cutting operation, the gas pressure should be controlled so as to keep a positive pressure at the point of welding or cutting. All slots or open ends shall be closed immediately to prevent air from entering the line. This is particularly important if two openings are at different elevations.

If it is not possible to keep the pipeline full of gas at a positive pressure, the pipeline should be purged with air or an inert gas. The atmosphere in the work area should be tested with a combustible gas indicator before starting the work and at intervals during the progress of the work.

III. ARC WELDING EQUIPMENT

A. Arc-Welding Machines

Welding equipment shall not be handled carelessly even though the voltages are low and normally will not cause injury or severe shock. These voltages are, nevertheless, high enough so that under certain circumstances they may be dangerous to life. This is especially true when the welder is sweaty or wet. He/She should never perm it the electrode or the electrode holder to touch either his bare skin or any wet covering on his body. Electric shock can be avoided by using electrode holders with well insulated jaws and cables, dry protective coverings on the hands and body and, by not grounding the body. All arc-welding equipment should be maintained in safe working order at all times. Commutators should be kept clean to prevent excessive flushing. Fine sandpaper, such as No. 00, or commutator polish should be used. Gasoline and other flammable liquids must never be used for cleaning commutators. Periodic inspections are strongly recommended. The frame of the welding machine (except engine driven machines) should be grounded. It is good practice to blowout the entire welding machine occasionally with clean, dry compressed air. Instructions covering operation and maintenance of equipment supplied by the manufacturers shall be strictly followed.

Welding equipment used in the open should be protected from weather. Protective coverings shall not obstruct the ventilation of the machine. When not in use, he equipment should be stored in a clean, dry place. Machines which have become wet shall be thoroughly dried before being used.

B. Electrode Holders

Electrode holders shall have a capacity capable of safely handling the maximum rated current required by the electrodes to be used. The cooling of hot electrode holders by dipping them in water is not permitted.

Electrodes should be removed from holders when not in use. The electrode holders, when not in use, should be placed so that they cannot make electrical contact with persons or conducting objects.

Welders should check their equipment regularly to see that electrical connections and insulation on the holders and cable are in good order. Items that appear unsafe should be promptly reported to the proper supervisors, and use of such equipment shall be discontinued until repaired. Repairs shall be made only be qualified personnel.

C. Welding and Grounding Cable and Connectors

All cables shall be of the completely insulated flexible type, capable of handling the maximum current requirements of the work in progress. The following table lists the minimum cable sizes which may be used to carry the current specified.

WELDING CABLES	
Current (Amps)	**Cable Size**
100	4
150	3
200	2
300	1/0
400	2/0
500	3/0
600	4/0

The first ten feet of cable extending back from the electrode holder shall be free from repair or splices. When splicing lengths of cable, insulated connectors with a capacity at least equivalent to that of the cable shall be used. If connections are made with cable lugs, they shall be securely fastened together by more than one bolt. the exposed metal parts of the lugs shall be completely insulated.

To prevent premature breakdown of the insulation, cables should be kept dry and free from grease and oil. When a cable becomes worn through, the portion exposed shall be protected by means of rubber and friction tape or equivalent.

When welding some distance from the machine the cables should be protected so that they will not be damaged. Extreme care should be taken to keep the welding cables away from power supply cables.

D. Ground Returns Other Than Cables

Welding current preferably should be returned to the welding machine by a single cable from the work to the welding machine. However, it is permissible to connect a cable from the welding machine to a common connector on which the work rests or to which it is connected. Conduits carrying electrical conductors, chains or wire ropes, shall not be used for a ground return circuit.

When a building, structure or pipeline is used as a ground return circuit, it should be checked to see that electrical contacts exists at all joints. Sparking or heating at any point are causes for rejection of the structure as a ground circuit. Where a structure or pipeline is continuously employed as a ground return circuit, all joints shall be bonded.

IV. WELDING AND CUTTING EQUIPMENT

A. General

Valve protection caps shall be properly installed prior to the transportation of oxygen, acetylene and other high pressure cylinders over any road or highway.

Extreme care should be taken to avoid accumulating and mixing flammable gases and air. To avoid confusion, shielding gases, fuel gases and oxygen should be described by their proper name and not by the words .gas. and .air.

No attempts shall be made to mix fuel gases in a cylinder or transfer gas from one cylinder to another. Only cylinders constructed and maintained in accordance with the regulations of the Interstate Commerce Commission shall be used.

All cylinders shall be legibly marked with the chemical or trade name of the gas. The numbers and markings which are stamped into the cylinder shall not be tampered with. Also, no one shall tamper with the safety devices in the cylinders or valves.

When being stored on the inside of a building, oxygen and fuel-gas cylinders should be separated by a fire-resisting partition. The storage area shall be a well ventilated, dry location, away from sources of heat, highly combustible materials, elevators, stairs or gangways. The cylinders shall be held in position by a chain or other similar devices that will keep them stationary and upright. When stored outside, oxygen and fuel-gas cylinders should be stored separately. They shall be protected against ice and snow as well as the direct rays of the sun.

If a cylinder valve freezes, it may be thawed with warm (not boiling) water. Cylinders should be used in rotation as received from the supplier so that they do not remain in storage any longer than is necessary. Cylinders must be handled very carefully. Rough handling is liable to damage the cylinder, valve or safety devices. Cylinders shall not be dragged or slid but can be moved for short distances by tilting and rolling on their bottom edge. When being transported by hand truck, they shall be held with a chain or other similar device. When handling cylinders with a crane or derrick, a suitable platform must be used; handling with slings or electric magnets is prohibited. Valve protection caps shall not be used for lifting cylinders from one vertical position to another. However, it is permissible to raise a cylinder from a horizontal to a vertical position by grasping the valve protection cap. Cylinders shall be in an upright position when transported. Cylinders should be kept far enough away from the actual welding or cutting operations so that sparks, hot slag or flame will not reach them. They shall not be placed where they might become part of an electrical circuit, such as an accidental grounding circuit for electric arc welding. Nothing shall be placed on top of a cylinder when it is in use. Shielding gases, fuel gas or oxygen shall never be used from cylinders, through devices equipped with shut-off valves, without reducing the pressure by means of a regulator attached to the cylinder or manifold. Before connecting a regulator to a cylinder valve, the valve shall be opened slightly and closed immediately. This is called cracking and is intended to clear the valve of dust or dirt that otherwise might enter the regulator. The person opening the valve must never stand directly in front of the valve outlet, the cylinder valve must never be opened near a source of ignition. After the regulator is attached, the cylinder valve should be opened slowly to allow the high pressure to bleed gradually into the regulator.

If a leak should develop in a safety device, the cylinder should be removed to the out-of-doors, well away from any source of ignition. The valve should then be opened slightly, and the contents allowed to escape. The cylinder should be plainly tagged and the supplier notified.

In order to prevent leakage, the torch and cylinder valves shall be closed when the torch is not to be used for a short period of time.

Before removing a regulator from a cylinder valve, the valve shall be closed and the gas released from the regulator. When a cylinder is not in use, the valves shall be closed and the valve protection caps in place and hand-tight. Empty cylinders shall be marked empty of "M" and separated from the full cylinders for prompt return to the supplier.

B. Fuel-Gas Cylinders

Fuel gas cylinders shall be stored with the valve end up. Acetylene shall not be utilized under pressure in excess of 15 psi unless an absorption material is used. The use of liquid acetylene is prohibited. Cylinders inside a building, except those in actual use or attached ready for use, shall be limited to a total capacity of 2,000 cubic feet. If propane is used it should be limited to 250 lbs. (gross). When these limits are exceeded, the cylinder shall be kept outside and signs posted reading -**DANGER - NO SMOKING, MATCHES OR OPEN FLAME**- or other similar wording.

An acetylene cylinder valve shall not be opened more than 1-1/2 turns of the spindle. If a special wrench is required it shall be left in position on the stem of the valve while the cylinder is in use. In the case of manifolded or coupled cylinders, at least one wrench shall always be available for immediate use. If the valve is opened and a leak is found around the valve stem, the valve should be closed and the gland nut tightened. If this does not stop the leak, the cylinder shall be removed to the out-of-doors, properly tagged, and the supplier advised. A regulator may be attached to a fuel gas cylinder valve to temporarily stop a leak through the valve seat.

C. Oxygen Cylinders

Oxygen will not bum but it supports and accelerates combustion, and will cause oil and other similar materials to bum with great intensity. Oil or grease in the presence of oxygen under pressure may ignite violently. therefore, all parts of the oxygen supply system must be kept free from oily or greasy substances. Oxygen cylinders or apparatus shall not be handled with oily hands or gloves nor shall they be placed where they could come in contact with oil or grease. A jet of oxygen should never be allowed to strike an oily surface, greasy clothes, or enter a fuel oil or other storage tank. Oxygen shall never be substituted for compressed air for use in pneumatic tools or similar equipment.

Oxygen cylinder valves shall not be tampered with not should any attempt be made to repair them. A hammer or wrench should never be used to open cylinder valves. If valves cannot be opened by hand, the supplier should be notified. After a regulator is attached, the oxygen cylinder valve should be opened slightly. After the pressure is equalized in the gages, the valve should be opened the rest of the way. If the high pressure is suddenly released, it is liable to damage the regulator and pressure gages. The person opening the cylinder valve should always stand to one side of the regulator and gages.

D. Shielding Gas Cylinders

Atmospheres for shielding an arc are of several types and may consist of inert gases, active gases or mixtures of inert and active gases. Cylinders containing these gases shall be stored away from extremes of temperature. Mixing of different gases in cylinders shall be prohibited. Shielding gas cylinder valves shall not be tampered with nor shall attempts be made to repair them. A hammer or wrench should never be used to open cylinder valves. If valves cannot be opened by hand, the supplier should be notified.

After a regulator or flow-meter is attached, the cylinder valve should be opened slightly to avoid sudden release of high pressure against the regulator components.

The person opening the valve should always stand to one side of the regulator or flow-meter.

E. Manifolding of Cylinders

Manifolds shall be installed under the supervision of someone familiar with their construction and use. All manifolds and parts used in manifolding shall be used only for the fuel-gas or gases for which they are approved. When acetylene cylinders are coupled, approved flash arresters shall be installed between each cylinder and the coupler block.

Each fuel-gas cylinder connection should be provided with a flashback arrester. A shut-off valve shall be provided in the manifold discharge line. Acetylene and liquefied fuel-gas cylinders that are to be manifolded shall be in a vertical position and contain approximately equal pressures. Fuel-gas cylinders connected to one manifold inside a building shall be limited to a total gas capacity of 3,000 cubic feet. More than one such manifold, each supplying one torch or one machine, may be located in the same room if separated by at least 50 feet. Where it is necessary to manifold fuel-gas cylinders having an aggregate gas capacity in excess of 3,000 cubic feet, they shall be located outside or in a special building or room. Special buildings or rooms, if provided, shall have no other occupancy except for the storage of cylinders containing fuel-gases and drums of calcium carbide.

All manifold systems shall have a minimum of changes in direction. they shall be protected against damage and vibration and shall have sufficient allowance for expansion and contraction. After assembly, the piping shall be thoroughly blown out with air or nitrogen to remove foreign materials. For oxygen piping, only oil-free air or oil-free nitrogen shall be used.

When combustible gas lines of other parts of equipment are being purged of air or gas, open flames or other sources of ignition shall not be permitted in the area. No welding of additional hangers or support to any oxygen or acetylene manifold line should be done until after the line has been thoroughly purged.

Black steel, wrought iron, brass or copper shall be used for oxygen piping. Extra heavy pipe shall be used where the pressure is over 150 psi. For lower pressures, standard weight pipe or approved seamless non-ferrous tubing may be used. For pressures in excess of 700 psi, non-ferrous pipe and fittings are recommended. All fittings and lengths of pipe for service lines hall be examined internally before assembly and, if necessary, hammered to free them from scale or dirt. They shall be washed out with a suitable non-flammable solution which will remove grease and dirt. Hot solutions of caustic soda and tri-sodium phosphate are recommended.

Steel or wrought iron pipe only shall be used for acetylene piping. Under no circumstances shall acetylene gas be brought in contact with unalloyed copper except in a torch. Joints in steel or wrought iron pipe shall be welded or made with threaded or flanged fittings. Rolled, forged or cast steel or malleable iron fittings may be used. Joints in brass or copper pipe may be welded or made up with threaded or flanged fittings; or, if the socket type, they may be brazed. Joints in seamless copper, brass or other non-ferrous tubing shall be made by means of suitable fittings; or, if of the socket type, they may be brazed. Joints shall not be soldered. Threaded connections in oxygen piping should be tinned or made up with litharge and glycerin. Litharge and water may be used for service pressures over 300 psi. These and other joint compounds approved for oxygen service shall be applied only to the male threads. All piping and valves shall be tested and proven to be gas-tight, at one end and on-half times the maximum working pressure. they shall be thoroughly purged of air before being placed in service. Any material used for testing oxygen lines must be completely oil-free. Flames shall not be used to detect leaks.

All exposed oxygen and fuel gas pipelines should be identified by a color code. Where more than one fuel gas is employed, the pipelines supplying the different fuel gases shall be identified. A color chart, indicating the colors employed, shall be prominently displayed.

All outlet stations shall be suitably identified. Signs clearly establishing the location and identify of section shut-off valves should be provided.

V. FIRE PREVENTION AND PROTECTION

Where practicable, move the object to be welded to a safe location designated for welding. If the object cannot readily be moved, all movable fire hazards in the vicinity shall be removed. If neither of these above conditions can be satisfied, the following precautions shall be taken:

1. Protective shields shall be used to confine the heat, sparks, and slag.

2. If the floor is constructed of combustible materials, it must be swept clean, thoroughly wetted with water, or covered with damp sand, sheet metal, asbestos or equivalent. Provision shall be made to protect welders from shock when floors are wet.

3. Wherever there are floor openings or cracks in the flooring that cannot be closed, there should be no exposed combustible materials on the floor below. This same precaution should be observed with regard to cracks or holes in walls, open doorways and open or broken windows.

4. Suitable fire extinguishing equipment shall be available at all times.

5. If the conditions warrant, it may be necessary to have additional personnel on hand as fire watchers. If such personnel are necessary, they shall be present during the work period and for a sufficient period of time after completion of the work to insure that no fire exists. When a sprinkler system exists, it should not be turned off while welding or cuttings. However, sheet asbestos or damp cloth guards may be used to shield the individual sprinkler heads temporarily.

VI. WELDING OR CUTTING CLOSED CONTAINERS

A. General

Welding or cutting of containers that have held combustibles should be attempted only by experienced personnel and under the supervision of persons familiar with the characteristics of the previous contents. However, this work shall not be performed on used drums, barrels, tanks or other containers until they have been cleaned. This cleaning shall remove all flammable materials such as grease, tars, acids or other materials which, when heated, might produce flammable or toxic vapors. In addition to the cleaning methods described below, it is desirable to fill the container with water during welding or cutting operations.

All sources of ignition shall be removed from the vicinity of the container, before cleaning is started. Personnel cleaning the container shall be protected against harmful exposure to toxic gas if practical, the container should be cleaned in the open. Otherwise, the room should be well vented. Empty and thoroughly drain the container, including all internal piping, traps and standpipes. Removal of sludge and sediment may be facilitated by scraping with non-sparking tools. Some material can be removed by rotating the container with a loose brass chain on the inside. Clean each compartment in a container similarly, regardless of which compartment is to be welded or cut. Before starting to weld or cut, the residue shall be disposed of The person engaged in welding and cutting should avoid working directly in front of openings in the container. In order to allow vapors to escape, leaks on the sides of a container should be repaired before repairing those on the top.

B. Cleaning Methods

The following cleaning methods are recommended:

1. Water Treatment - When the substance is readily soluble in water, it can be removed by completely filling the container with water and draining several times.

The container must be flushed thoroughly to remove all traces of the substance. If the substance is not readily soluble in water, the container must be treated by the hot chemical solution method or by the steam method described below.

2. Hot Chemical Solution Method of Cleaning - The chemicals generally used are tri-sodium phosphate (strong washing powder), or a commercial caustic cleaning compound dissolved in water to a concentration of from two to four ounces of chemical per gallon of water. Suitable goggles, gloves and other protective covering should be used when cleaning by this method.

Close all openings in the container, with the exception of the drain and filling connection or vent. Use damp asbestos, damp wood flour or similar material for sealing cracks or other damaged sections. Fill the container to overflowing with water, preferably filling through the drains. If there is no drain, flush the container by inserting the hose through the filling connection or vent. The hose outlet should be moved to the bottom of the container to get agitation from the bottom upward. Drain the container thoroughly; then dissolve the cleaning chemical in a small amount of boiling water an pour into the container. Then fill the container with water. Make a steam connection to the container either through the drain connection or by a pipe entering through the filling connection or vent and leading to the bottom of the container. Admit steam to the solution and maintain the solution at a temperature of 170 to 190°F. At intervals during the steaming, add enough water to discharge by overflowing any foreign matter that may have collected at the top. Continue steaming for at least 15 to 20 minutes, longer if necessary, until no foreign matter appears at the top of the container. Drain the container and inspect the container. If it is not clean, repeat the above steps and re-inspect. When flammable vapors are suspected to be present, use only flashlights or lanterns suitable for this service. Close the container openings for 15 minutes; then re-open and test the openings with a combustible gas indicator. If the concentration of flammable vapor in the sample is not below the lower limit of flammability, repeat the entire cleaning procedure. If steaming facilities are not available, an alternate method, although less effective, is the use of a cold-water solution with the amount of cleaning compound increased to about 6 ounces per gallons of water. It will help if the solution is agitated by rolling the container or by blowing air through the solution.

3. Steam Method of Cleaning - Fill the container at least 25% full with hot soda or soda ash solution (1 lb. to a gallon of water) and agitate it sufficiently to insure that the inside surfaces are thoroughly flushed. Drain the container thoroughly and close all openings.

In this method, use low pressure steam. the steam shall be injected through a hose not less than 3/4- diameter. the steam shall be controlled by a valve at the inlet to the hose. If a metal nozzle must be used at the outlet, it should be made of non-sparking material and should be electrically connected to the container. The container, in turn, should also be grounded. Inject steam into the container, preferably through the drain, for as long as is necessary. When a container has only one opening, position the container so the condensate will drain from the same opening into which the steam hose is inserted. continue steaming until the container is free from odors and the container is hot enough to permit steam to escape freely.

Thoroughly flush the inside of the container with boiling water and drain. Inspect the inside of the container as described in paragraph 2 above. If examination shows that the container is not clean, repeat the above steps and re-inspect. When using steam or hot water, suitable protective clothing should be worn to guard against burns. Test the container for flammability as described in paragraph 2.

3. Inert Gas Treatment - As an alternative to filling the container with water during welding and cutting, an inert

gas may be used. This treatment is also supplementary to any of the cleaning methods described in paragraphs 1, 2 and 3. Either carbon dioxide or nitrogen shall be used. When carbon dioxide is used, a minimum concentration of 50% is required, except where the flammable vapor is principally hydrogen, carbon monoxide or acetylene. For these latter vapors, a minimum concentration of 80% is required. Carbon dioxide is used either from cylinders, or as a solid (dry ice). Carbon dioxide is heavier than air and during welding or cutting, it will tend to remain in containers having top openings. when nitrogen is used, the concentration should be at least 10% greater than those specified for carbon dioxide. Cylinder nitrogen may be used in the same way as cylinder carbon dioxide. Close all openings in the container, with the exception of the filling connection and vent. Use damp asbestos, damp wood flour or similar material for sealing cracks or other damaged sections. First, fill the container with water except for a small area where the welding or cutting is to be done.

To facilitate this, the container shall be placed so that the area to be welded or cut is on top. Add enough inert gas so that the space has at least the minimum concentration listed above. Inject the inert gas into the container at low pressure (about 5 psi through the drain, if possible. If the drain connection cannot be used, introduce the inert gas through the filling opening or vent and extend the hose to the bottom of the container or at least below the water level so that any remaining flammable or toxic gases are forced out. when a large volume of carbon dioxide is required, the rate of withdrawal of the gas from the cylinder can bed increased, without freezing the cylinder valve, by inverting the cylinder. If nitrogen is used, the cylinder shall always remain upright. When using solid carbon dioxide, crush and distribute it evenly over the greatest possible area to secure a rapid formation of gas. Avoid bodily contact with solid carbon dioxide. Avoid breathing large amounts of carbon dioxide.

Determine whether enough carbon dioxide or nitrogen is present to make the contents of the container non-flammable through the use of a combustible gas indicator, a Lamer gas sampler, or in the case of carbon dioxide, an Orsat or other similar gas analysis apparatus. Maintain a high carbon dioxide or nitrogen concentration during the entire welding or cutting operation.

VII. PROTECTION OF PERSONNEL

A. General

Welders and helpers working on platforms, scaffolds, or runways shall use safety belts, life lines, or similar devices in the absence of railings. Life belts and similar devices should be of a quick release type. Welders and helpers working in bell holes, ditches, tunnels, and below heavy objects shall be protected from falling objects or cave-ins.

B. Eye Protection

Suitable eye protection shall be provided for all welding, cutting, and grinding operations.

C. Protection of Other Workers from Arc-Welding Rays

Where arc-welding is regularly carried on, the walls of the welding by should be painted a non-reflecting color. Where the work , permits, the welder should be enclosed by screens, or in an individual booth painted with a non-reflecting color, such as zinc oxide and lamp black. Booths and screens shall permit circulation of air at the floor level.

D. Protective Clothing

Except when engaged in light work, all welders should wear flame proof gauntlet gloves. Flameproof aprons made of leather, asbestos, or other suitable materials are also desirable. Capes or shoulder covers made of leather or other suitable material should be worn during overhead welding or cutting. Woolen clothing is preferable to cotton. All outer clothing should be reasonably free, from oil or grease. It is recommended that sleeves and collars be kept buttoned and pockets be eliminated from the front of overalls and aprons. Trousers or overalls should not be turned up on the outside. Low-cut shoes with unprotected tops should not be used. For overhead welding, or welding in extremely confined spaces, ear protection is sometimes desirable. This may be accomplished by placing wool or rubber plugs in the ears or by covering them with wire screen protectors. If there is exposure to falling objects, hard hats or head protectors should be used.

E. Ventilation and Health Protection

Sufficient ventilation for respiratory protection shall always be provided. When welding in a space screened on all sides, the screening should extend to within 2 feet of the floor so that air movement is not restricted. Ventilating systems shall keep the amount of toxic fumes or dust below the maximum allowable concentration as defined by the ASA z37, Allowable Concentrations of Toxic Dusts and Gases. When ventilating is impractical, welders must use respiratory protective equipment approved by the U. S. Bureau of Mines. In confined spaces or other locations where the amount of toxic substances is likely to exceed the maximum allowable concentrations, forced-air respirators are required. This applies not only to the welder but also to helpers and other personnel in the immediate vicinity. Air supply for such equipment shall be clean and of suitable temperature. When welding is one small operation in a large area, it is best to apply local exhaust ventilation to prevent contamination of the general work area.

Individual respiratory equipment should be well maintained. It should not be transferred from one employee to another without being sterilized. (For methods of sterilization, see Rule 140 of the Safety Code for the Protection of Heads, Eyes and Respiratory Organs, ASA Z2.)

When welding or cutting in a confined space, gas cylinders and welding machines shall be left on the outside. Before starting, heavy portable equipment mounted on wheels shall be securely blocked to prevent accidental movement.

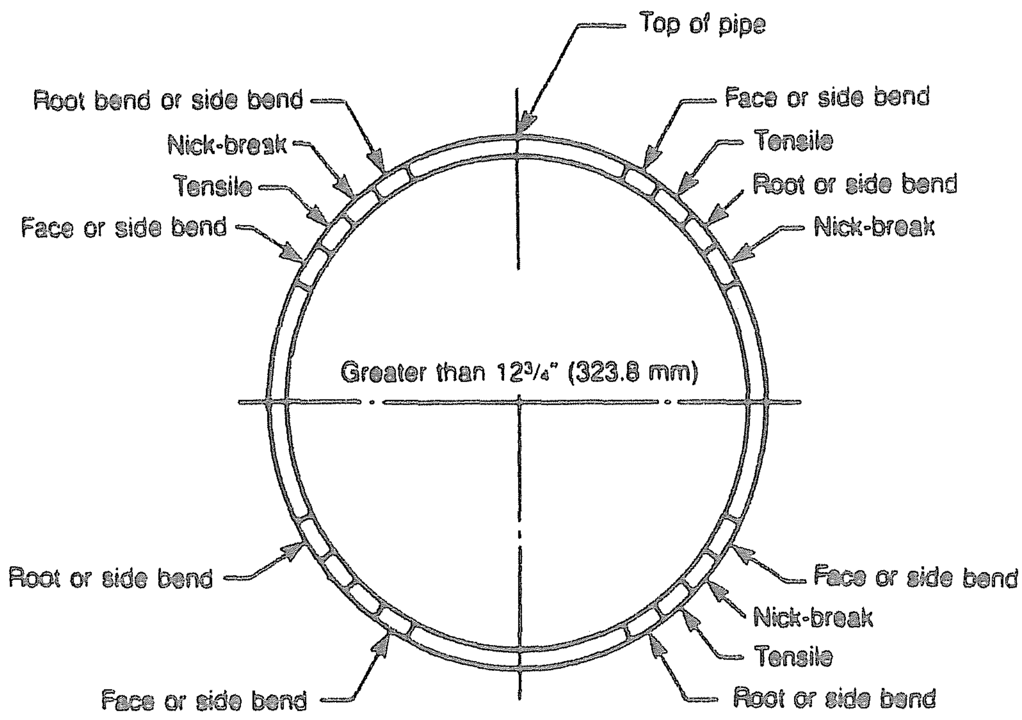
Where a welder must enter a confined space through a manhole or other small opening, means shall be provided for quickly removing him in case of emergency.

After welding operations are completed. the welder shall mark the hot metal or provide some other means of warning.

F. First Aid Provisions

First aid equipment shall be available at all times. There should be employees trained to render first aid on every shift. All injuries shall be reported as soon as possible for medical attention. First aid should be rendered until medical attention can be provided.

Location of Test Specimens for Procedure Qualification: Test Butt Weld



Notes:

1. At the company's option, the locations may be rotated, provided they are equally spaced around the pipe; however, specimens shall not include the longitudinal weld.
2. One full-section tensile specimen may be used for pipe with a diameter less than or equal to $1^{5}/_{16}$ inch (33.4 millimeters).

How can an operator determine whether pipeline welding is performed as required?

Welding must be performed in accordance with written welding procedures qualified to produce acceptable welds. For typical pipeline welding, standard API 1104 is most often relied on. The welding procedures should include:

1. Records of the complete results of the procedural qualification test
2. Procedural specification
3. Identifying the process
4. Identifying the materials
5. Identifying the wall thickness groups
6. Identifying the pipe diameter groups
7. Showing a joint design sketch
8. Designating filler metal and number of beads
9. Designating electrical characteristics
10. Designating flame characteristics
11. Designating positions or roll welding
12. Designating direction of welding
13. Designating maximum time lapse between passes
14. Designating type of line-up clamp and removal criteria
15. Designating type of cleaning tool used
16. Specifying preheat and post heat practices
17. Designating composition of gas and range of flow rate
18. Designating type and size of shielding flux
19. Designating range of speed of travel for each pass
20. Essential variables Most changes in b. require requalification of the welding procedure. (Refer to API 1104, paragraph 2.4.)
21. Welding and testing of test joint
22. Preparation of specimen
23. Destructive tests - butt welds
24. Tensile strength test
25. Nick break test
26. Root and face bend test
27. Side bend test
28. Destructive test - fillet welds: Break in weld as specified
29. Welders who are qualified for the welding procedure to be used must perform welding.
30. The welder shall be qualified under one of the applicable requirements specified.
31. Transmission pipelines
32. API 1104, Section 3; or
33. ASME Boiler and Pressure Vessel Code, Section IX Distribution pipeline
34. API 1104, Section 3;

35. ASME Boiler and Pressure Vessel Code, Section IX; or

36. 49 CFR Part 192, Appendix C, Section I (not acceptable for service line to main connection welding).

37. Service line to main connections

38. API 1104, Section 3;

39. ASME Boiler and Pressure Vessel Code, Section IX; or

40. 49 CFR Part 192, Appendix C, Sections I and II.

41. Welder qualification under API 1104, Section 3.

42. Perform qualification test as specified in the written welding procedure in the presence of the company's representative.

43. Essential variables (certain changes require re-qualification).

44. For single qualification refer to API 1104, paragraph 3.11; or

45. For multiple qualification refer to API 1104, paragraph 3.21.

46. Welding and testing of test joint

47. Preparation of specimen(s)

48. Visual examination

49. Destructive test - butt welds Determine if all or part of these tests is required: 1 Tensile strength test *(optional)* 2 Nick break test 3 Root and face bend test 4 Side bend test

50. Destructive tests - fillet welds: Break in weld as specified.

51. Visual inspection

NOTE: Nondestructive radiographic inspection of butt welds only can be done in lieu of (3)(c) above. This is the operator's option. The standards of acceptability for radiographic inspection are specified in API 1104, paragraph 6.0.

(4) Keep the following records:

(a) Detailed test results for each welder.

(b) List of qualified welders and the procedures(s) for which they are qualified.

(c) Welder qualification under 49 CFR Part 192, Appendix C, Section I

(1) Perform qualification test on pipe 12 inches or less in diameter

(2) Use position welding

(3) Preparation must conform to written welding procedure

(4) Destructive test. - root bend test

(5) Visually inspect

(6) Keep the following records:

(a) Detailed test results for each welder

(b) List of qualified welders under this procedure

(d) Welder qualification under of 49 CFR Part 192, Appendix C, Sections I and II

(1) Perform c. above

(2) Weld service line connection fitting to a pipe typical of the main using similar position as one would in actual production welding

(3) Destructive test - break, or attempt to break, the fitting off the run pipe

(4) Keep the following records:

(a) Detailed test results for each welder

(b) List of qualified welders under this procedure

(e) Remain qualified under API 1104, Section 3 or ASME Boiler and Pressure Vessel Code, Section IX, if:

(1) Within the preceding six months, welder has welded with the particular welding process (either test or production welding is acceptable), and welder has made a weld and had it tested satisfactorily either destructively or nondestructively. (Refer to 2b(3) for required procedure.)

(f) Remain qualified under either 49 CFR Part 192, Appendix C, Section I or II, if:

(1) Within the preceding 7½ months but at least twice each year, welder has had one production weld cut out, tested, and found acceptable in accordance with the initial qualification test; or,

NOTE: Welders who work only on service lines 2 inches or smaller in diameter may be tested in each 6-month period under 49 CFR Part 192, Section III, Appendix C in lieu of f(1) above, but at the same intervals.

(2) Within the preceding 15 months, but at least once each year, welder has re-qualified under 49 CFR Part 192 Appendix C

(3) Production welding

a. Use a welder qualified in a qualified welding procedure.

b. The following items should be part of the written welding procedure:

(1) Weather protection - 49 CFR §192.231

(2) Preparation - 49 CFR §192.235

(3) Visual Inspection - 49 CFR §192.241

(4) Nondestructive Testing (under specified conditions) - 49 CFR §192.243. Must meet standards of acceptability in API 1104, Section 6.

c. Miter joint restrictions The use of miter joints is restricted as follows:

(1) If MAOP produces a hoop stress of 30 percent or more SMYS, the joint cannot deflect the pipe more than 3 degrees.

(2) If MAOP produces a hoop stress of more than 10 percent SMYS but less than 30 percent, the joint cannot deflect the pipe more than 12.5 degrees and must have at least one pipe diameter separation from another miter joint.

(3) If MAOP produces a hoop stress of 10 percent of SMYS or less, the joint cannot deflect the pipe more than 90 degrees.

d. Repair or removal of defect requirements is as follows:

(1) Remove or repair all welds that fail to pass the nondestructive test requirements (standards of acceptability in API 1104, Section 6).

(2) Remove all welds that contain cracks that are more than 8 percent of the weld length.

(3) Repairs must have the defect removed down to clean metal and the segment to be repaired must be preheated if conditions exist which would adversely affect the quality of the weld repair. Inspect the repaired weld.

(4) Repair of a crack, or any defect in a previously repaired area, must be in accordance with written weld repair procedures that have been qualified under this guidance manual.

20th EDITION SUBJECT STAY API 1104

API Specification 5L, "Specification for Line Pipe"

The Federal pipeline safety regulations at 49 CFR Parts 192 and 195 incorporate by reference numerous consensus standards relating to the design, construction, operation, and maintenance of natural gas and hazardous liquid pipelines. 49 CFR §§ 192.7 and 195.3 currently incorporate by reference the 43rd edition of API Specification 5L "Specification for Line Pipe" (43rd edition and errata, 2004), a standard specification for the manufacture of line pipe.

API has issued a more recent edition of this standard: API Specification 5L, "Specification for Line Pipe" (44th edition, October 2007, and effective October 1, 2008). This new edition includes higher toughness standards, more restrictive pipe dimension limits, more comprehensive inspection methods, and new sour service and offshore pipe specification and inspection requirements. PHMSA staff has reviewed this edition, compared it to the earlier referenced edition, and believes the more recent edition provides a higher level of safety. We intend to incorporate by reference the updated API standard specification discussed above in the normal rulemaking process.

By letters dated September 26, 2008 and December 4, 2008, EVRAZ, Inc. and California Steel Industries, Inc., petitioned PHMSA to allow the use of the 44th edition of API 5L immediately while rulemaking proceeds. The petitioners explained that the failure to allow the use of the newer standard would adversely impact the metallurgy and tolerances of the pipe manufactured in their plants and that the impact was industry-wide. Because of the lead time needed to order steel pipe for major infrastructure projects, the petitioners urged PHMSA to allow the use of the newer standard to avoid adverse impacts on their customers' projects involving thousands of tons of pipe and hundreds of workers. I find that these circumstances justify the stay of enforcement of the earlier edition of API 5L.

API 1104 "Welding of Pipelines and Related Facilities"

49 CFR §§ 192.7 and 195.3 currently incorporate by reference the 19th edition of API 1104 "Welding of Pipelines and Related Facilities" (19th edition, 1999 including Errata October 31, 2001), a standard for welding of pipe.

API has issued a more recent edition of this standard: API 1104 "Welding of Pipelines and Related Facilities" (20th edition, October 2005 including Errata/Addendum July 2007). This new edition of API 1104 includes more conservative acceptance criteria for pipeline welding, in particular for higher strength steels. PHMSA staff has reviewed this edition, compared it to the earlier referenced edition, and believes the more conservative acceptance criteria in the more recent edition provide a higher level of confidence in the quality of welds. We intend to incorporate by reference the updated API 1104 standard in the normal rulemaking process. However, PHMSA staff has determined that allowing the use of the improved welding standard without delay will benefit public safety. I find the above circumstance justifies staying the enforcement of the earlier edition of API 1104.

Unit 2001.6 Specify welding process, procedures and controls to achieve production requirements
ECITB/ECRS Unit 5.02

Commentary

You will provide specifications for the application of the agreed welding process and its mode of operation, which will include all equipment requirements for welding, mechanization, automation or robotics, manipulating, positioning, work holding and handling.

You will specify the technical control of welding activities through the preparation and approval testing of welding procedures which may require client and/or independent certification. The approved welding procedures are correctly documented, conform where appropriate to relevant Standards and are issued through a controlled circulation system. The WPS is supported by controlled instructions covering fabrication procedures, (typically sequence of assembly or construction, distortion control, component handling, manipulation for welding and location/alignment of components).

You will include in the documentation, as appropriate within the organization, information about the control of any specific welding related health, safety and environmental hazards not covered by existing organizational practices or procedures.

The controlled circulation system will include a change control procedure through which modifications to WPSs and instructions are issued.

Interpretation of Performance Statements

a) Obtain accurate information about production requirements relevant to product fabrication and quality.

b) Specify the application of the selected welding processes and their modes of application.

c) Identify the equipment and consumables requirements for the selected processes and their modes of application.

d) Identify the welding and related activities required to implement the selected processes and modes of application.

e) Identify the controls required for the effective application of the welding and related equipment and any special health and safety matters which require attention.

f) Prepare the necessary welding procedure specifications and fabrication instructions to implement the required controls.

g) Ensure that welding procedure specifications are correctly approved and that all aspects of welded fabrication comply with relevant regulations and standards.

h) Record approved welding procedure specifications, fabrication instructions and health and safety matters in the appropriate system for controlled circulation to relevant personnel.

ECITB/ECRS Unit 5.02
Unit 2001.6 Specify welding process, procedures and controls to achieve production requirements

PERFORMANCE STATEMENTS	KNOWLEDGE AND UNDERSTANDING
You must be able to : a) Obtain accurate details of the production requirements for engineering products or processes b) Select the most effective production methods for the engineering products or processes c) Identify the resources that are necessary for the production methods d) Identify the production activities required to implement the production methods e) Identify the control parameters for the equipment used during the production methods f) Specify clearly the procedures for implementing the production methods g) Ensure that the production methods and procedures comply with all relevant regulations and guidelines h) Record the production methods and procedures in the appropriate information systems **SCOPE** 1. Welding processes: documentation to establish welding processes selected for production and their modes of application 2. Production requirements: schedules identifying fabrication requirements for output, quantities, quality, timescales 3. Equipment: technical specification of welding equipment; calibration requirements; specification of application mode (manual, mechanized, automatic, robotic); requirements for work holding manipulation and positioning 4. Consumables: specification of types, sizes, classification and quantities	***Specific Knowledge*** **1. Production methods** *A detailed knowledge is required of:* i) Product specification ii) Production requirements **2. Welding Technology** *A detailed knowledge of relevant welding technology is required as identified by the appropriate sections of the latest issue of the Guideline for the International Welding Technologist, notably:* i) Welding processes: oxy-gas welding; special processes. Arc welding; the arc; power sources; TIG, MIG/MAG; MMA, submerged arc, resistance, plasma, electron beam, laser and friction welding. Other fusion welding processes. Mechanized and robotic welding; brazing and soldering. Cutting and edge preparation processes. Surfacing ii) Materials and their behavior during welding: structure and properties of metals; alloys and phase diagrams, iron carbon alloys, heat treatment, structure of the welded joint, testing materials and welded joints. Carbon-manganese, fine-grained, thermo-mechanically treated, low alloy, high alloy (stainless), creep and heat resistant steels; cracking phenomena, corrosion, wear and surface engineering. Cast irons and steels, copper, nickel, aluminum and their alloys. Joining dissimilar metals. Metallographic examination methods iii) Fabrication and applications: quality assurance in welded constructions; quality control during manufacture. Residual stresses and distortion. Plant, facilities, jigs and fixtures. Health and Safety. Measurement, control and recording. Non-destructive testing. Economics. Repair welding. Fitness for purpose; significance of defects

ECITB/ECRS Unit 5.02 - continued
Unit 2001.6 Specify welding process, procedures and controls to achieve production requirements

PERFORMANCE STATEMENTS	KNOWLEDGE AND UNDERSTANDING
You must be able to :	***Specific Knowledge***
5. Welding procedure specifications: development of production specifications; repairs to defective welds and corrective action; use of weldability assessment results; conformity with relevant standards; approval of procedures	**3. Service conditions** *A working knowledge is required of:* i) Conditions under which the product will operate in service ii) Historical service performance data
6. Fabrication procedure specifications and instructions: development of relevant specifications and instructions for product fabrication, notably sequence of assembly, distortion control, component handling, manipulation and positioning for welding, work holding; compliance with regulations and standards	**4. Resources** *A detailed knowledge is required of:* i) Equipment and consumables ii) Availability of resources
7. Recording: methods used to record specifications and instructions for use by others	**5. Regulations and guidelines relevant to welding and fabrication** *A working knowledge is required of:* i) European Directives; National legislation and regulations; European, International and National Standards ii) Sources of information
8. Controls: specification of controls needed to assure quality and output of fabricated products.	**6. Information systems** i) Systems for recording and issue of documentation for production; change control system
	7. Underpinning Knowledge *A working knowledge is required of:* 1. Principles of electricity, electronics and magnetism. Direct (DC) and alternating (AC) current supply, current, voltage, resistance, induction, capacity. Types of circuits. Transforming and rectifying AC. Generation of electron beams and their control 2. Principles of light transmission; generation of laser beams, laser optics 3. Friction as a heat source

ECITB/ECRS Unit 5.02 - continued **Unit 2001.6 Specify welding process, procedures and controls to achieve production requirements**
KNOWLEDGE AND UNDERSTANDING ***Specific Knowledge*** 4. Materials of construction: types, specifications, structure and properties, applications. Alloys, phase diagrams and transformations. Types of heat treatment and their effects. Methods of testing 5. Types of properties of relevant inert, active and fuel gases 6. Principles of materials handling and shop layout; mechanization and robotics. Computer aided manufacture. Use of computers in production management and control 7. Cost analysis and control systems for production; use of computers 8. Non-destructive testing: generation and transmission of ionizing radiation and ultrasonic beams. Use of magnetic fields and eddy currents.

MATERIAL SAFETY DATA SHEET (MSDS)

Tungsten Electrodes

Conforms to OSHA Hazard Communication Standard 29CFR 191

0.1200

Standard Must Be Consulted for Specific Requirements

XL TECHNOLOGIES, INC.

1501 NORMAN DRIVE, DARIEN, IL 60561

630-435-5469

EMERGENCY PHONE NUMBERS

BUSINESS HRS: 630-435-5469

CHEMTEC: 800-424-9300

SECTION I – PRODUCT IDENTIFICATION

Trade Name: Tungsten Electrodes for Welding

Chemical Name/Class: Tungsten; Element

Product Use: Welding; Metal-working Operations

Classification: AWS A5.12

SECTION II - HAZARDOUS INGREDIENTS

Important: This section covers the materials from which the product is manufactured. The fumes and gases produced during welding with the normal use of this product are covered under Section V. Thorium dioxide is subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA) and 40

CFR Part 372.

Designation		Chemical Composition Impurities .. 0.1%		Tip Color
ISO 6848	AWS A5.12	Oxide Additive%	Tungsten, %	
WT20	EWTh-2	ThO2:1.70-2.20 ..	97.30	Red
WP	EWP	***************	99.95	Green
WL15	EWLa-1.5	LaO2: 1.30-1.70	97.80	Gold
WC20	EWCe-2	CeO2: 1.80-2.20	97.30	Orange / Gray
WL10	EWLa-1	La2O3: 0.80-1.20	98.30	Black
WL20	EWLa-2	La2O3: 1.80-2.20	97.30	Sky-blue
WZ3	EWZr-1	ZrO2: 0.15-0.50	99.10	Brown
WZ8	****************	ZrO2: 0.70-0.90	98.60	White
WY20	****************	Y2O3: 1.80-2.20	97.30	Blue

The term **"HAZARDOUS MATERIALS"** should be interpreted as a term required and defined in **OSHA HAZARD COMMUNICATION STANDARD 29 CFR 1910.1200** however the use of this term does not necessarily imply the existence of any hazard.

SECTION III - PHYSICAL DATA

Melting Point: Approximately 3400..C	**Color: Silver-gray**
Boiling Point: Approximately 5900..C	**Odor: odorless**
Solubility in Water: Insoluble	**Vapor. Press: N/A at 25..C**
Specific Gravity (H2O=1): Approximately 19.3	**Vapor. Density: N/A**
Radioactive Isotope:	**Th-232**

SECTION IV – FIRE AND EXPLOSION HAZARD DATA

Non-Flammable: Welding arc and sparks can ignite combustibles. See Z-49.1 referenced in Section VI.

SECTION V - REACTIVITY DATA

Hazardous Decomposition Products

Welding fumes and gases cannot be classified simply. The composition and quantity of these fumes and gases are dependent upon the metal being welded, the procedures followed and the electrodes used.

Workers should be aware that the composition and quantity of fumes and gases to which they may be exposed, are influenced by: coatings which may be present on the metal being welded (such as paint, plating, or galvanizing), the number of welders in operation and the volume of the work area, the quality and amount of ventilation, the position of the welder's head with respect to the fume plume, as well as the presence of contaminants in the atmosphere (such as chlorinated hydrocarbon vapors from cleaning and decreasing procedure). When the electrode is consumed, the fumes and gas decomposition products generated are different in percent and form from the ingredients listed in Section II. The composition of these fumes and gases are the concerning matter and not the composition of the electrode itself.

Decomposition products include those originating from the volatilization, reaction, or oxidation of the ingredients shown in Section II, plus those from the base metal, coating and the other factors noted above.

Gaseous reaction products may include carbon monoxide and carbon dioxide. Ozone and nitrogen oxides may be formed by the radiation from the arc.

One method of determining the composition and quantity of the fumes and gases to which the workers are exposed is to take an air sample from inside the welder's helmet while worn or within the worker's breathing zone. See ANSI/AWS F1.1 publication available from the American Welding Society 550 N.W. LeJeune Road, Miami, Florida 33126.

SECTION VI – HEALTH HAZARD DATA

Occupational Safety and Health Administration 29 CFR 1910.1000 Permissible Exposure Limit (PEL). American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV[R]).

INGREDIENT	CAS No.	OSHA PEL	ACGIH TWA	ACGIH STEL
Tungsten (W)	**7440-33-7**	**-**	**5 mg/m3**	**10 mg/m3**
Thorium Dioxide	**1314-20-1**	**-**	**-**	**-**
Cerium Dioxide	**1345-13-7**	**-**	**-**	**-**
Lanthanum Dioxide	**1312-81-8**	**-**	**-**	**-**
Zirconium Oxide	**1314-23-4**	**5 mg/m3**	**5 mg/m3**	**10 mg/m3**
Yttrium Oxide	**1314-36-9**	**1 mg/m3**	**1 mg/m3**	

Threshold Limit Value: The ACGIH recommended general limit for welding fume NOC (Not otherwise classified) is 5 mg/m3 ACGIH-1985 preface states: “The TLC-TWA should be used as guides in the control of health hazards and should not be used as fine lines between safe and dangerous concentrations.” See section V for specific fume constituents, which may modify this TLV.

Common Entry Is by Inhalation.

Effects of Overexposure: Inhalation of welding fumes and gases can be dangerous to your health. Short-term (acute) overexposure to welding fumes may result in discomfort such as dizziness, nausea, or dryness or irritation of nose, throat, or eyes. Although the inhalation of Tungsten has the potential for causing transient or permanent lung damage, it is generally considered to exhibit a low degree of toxicity.

Thorium is a naturally occurring radioactive element. Its primary hazard lies in inhalation of dust/fumes. Normal handling of these electrodes is not expected to result in any significant radiation exposure. Considerable experience in refining and use of thorium has not revealed any adverse effects from industrial exposure. Long-term (chronic) over-exposure to welding fumes can lead to satyriasis (iron deposits in lung) and is believed to affect pulmonary function.

Arc Rays can injure eyes and burn skin.

Electric shock can kill.

See Section VIII.

Emergency and First Aid Procedures: Call for medical assistance. Use first aid procedures recommended by the American Red Cross. If breathing is difficult – give oxygen. If not breathing-use CPR (cardiopulmonary resuscitation).

Carcinogenicity: Thorium dioxide has been identified as a carcinogen by NTP, IARC and others. Evidence for its ability to cause cancer has come solely from its internal medical use.

SECTION VII - HANDLING AND STORAGE

Work Practices and Hygiene Practices: After the end of work shift, hands and other exposed skin should be thoroughly washed. Do not eat or drink during use of these products. Use ventilation and other engineering controls to minimize potential exposure to fumes during welding operations or to dusts if tips of electrodes are ground. Follow good housekeeping practices to ensure powders or dusts from grinding operations do not accumulate, which can be highly flammable and can pose special health hazards if from thorium-containing electrodes. Tungsten-Thorium Oxide alloys are generally safe to handle during use and almost all normal conditions and environments. **Special precautions must be taken during the grinding or machining of tips of electrodes that contain Thorium Oxide to avoid the generation and subsequent inhalation of dusts from these operations. Any dusts**

generated during these operations may be considered as "Source Material", as defined by the Nuclear Regulatory Commission, and therefore be subject to the requirements of 10 CFR, Parts 20 and 40. Routine wet mopping or vacuuming with an explosion-proof vacuum, fitted with a HEPA filter may be considered to reduce accumulation of dusts.

Storage and Handling Practices: All employees who handle these materials should be trained to handle it safely. Avoid breathing dusts or powders generated during grinding of electrode tips. Open packages and containers of these products slowly, on a stable surface. Packages and containers of these products must be properly labeled.

SECTION VIII – EXPOSURE CONTROLS / PERSONAL PROTECTION

Read and understand the manufacturer's instructions and precautionary label on this product. See American Standard Z49.1 Safety in Welding and Cutting, published by the AMERICAN WELDING SOCIETY, 550 N.W. Lejenune Road, Miami, Florida 33126 and OSHA Publication 2206 (29 CFR 1910), U.S. Government Printing Office, Washington D.C. 20402 for more details on the following topics.

Ventilation: Use plenty of ventilation and/or local exhaust at the arc, to keep the fumes and gases below the threshold limit value within the worker's breathing zone and the general work area. Welders should be advised to keep their head out of the fumes.

Respiratory Protection: Use respirable fume respirator or air supplied respirator when welding in a confined space or general work area where local exhaust and/or ventilation does not keep exposure below the threshold limit value.

Eye Protection: Wear a helmet or face shield with a filter lens shade number 12-14 or darker. Shield other workers by providing screens and flash goggles.

Protective Clothing: Wear approved head, hand and body protection, which help to prevent injury from radiation, sparks and electrical shock. See ANSI Z-49.1. This would include wearing welder's gloves and a protective face shield and may include arm protectors, apron, hats, shoulder protection, as well as dark substantial clothing. Welders should be trained not to allow electrically live parts to contract the skin or wet clothing and gloves. The welders should insulate themselves from the work and ground.

Waste Disposal Method: Discard any product, residue, disposal container, or liner in an environmentally acceptable manner approved by Federal, State and Local regulations.

INTRODUCTION

The fume from welding processes may contain compounds of chromium, including hexavalent chromium, and of nickel. The composition of the base metals, the welding materials used, and the welding processes affect the specific compounds and concentrations found in the welding fume.

IMMEDIATE EFFECTS OF OVEREXPOSURE TO FUMES CONTAINING CHROMIUM AND NICKEL

- Similar to the effects produced by fumes from other metals.
- Cause symptoms such as nausea, headaches, dizziness, and respiratory irritation.
- Some persons may develop a sensitivity to chromium or nickel which can result in dermatitis or skin rash.

CHRONIC (LONG TERM) EFFECTS OF EXPOSURE TO FUMES CONTAINING CHROMIUM AND NICKEL

- Definite effects are not yet determined
- Conclusions from the National Institute for Occupational Safety and Health (NIOSH): some forms of hexavalent chromium and nickel and their inorganic compounds should be considered occupational carcinogens (cancer causing agents).
- Conclusions from the International Agency for Research on Cancer (IARC): (1) there is limited evidence in humans for the carcinogenicity of welding fumes and gases, and (2) there is inadequate evidence in experimental animals for the carcinogenicity of welding fumes.

OVERALL EVALUATION

- Welding fumes are possibly carcinogenic to humans (Group 2B).
- No determination has yet been made concerning the health effects on welders or users of chromium- or nickel-containing alloys.
- Nevertheless, give consideration to the NIOSH and IARC conclusions.

HOW TO PROTECT AGAINST OVEREXPOSURE

- Do not breathe fumes and gases. Keep your head out of the fumes.
- Use enough ventilation or exhaust at the arc or both to keep fumes and gases from your breathing zone and general area. AWS disclaims liability for any injury to persons or to property, or other damages of any nature whatsoever, whether special, indirect, consequential or compensatory, directly or indirectly resulting from the publication, use of, or reliance on this Safety and Health Fact Sheet. AWS also makes no guaranty or warranty as to the accuracy or completeness of any information published herein.
- If ventilation is questionable, use air sampling to determine the need for corrective measures.
- Keep exposure as low as possible.

INFORMATION SOURCES

National Institute for Occupational Safety and Health (NIOSH). *Criteria for a Recommended Standard: Occupational Exposure to Chromium (VI),* NIOSH Publication No. 76-129. Cincinnati, OH (telephone: 800-356-4674; web site: http://www.cdc.gov/niosh/homepage.html). National Institute for Occupational Safety and Health

(NIOSH). *Criteria for a Recommended Standard: Occupational Exposure to Inorganic Nickel,* NIOSH Publication No. 77-164. Cincinnati, OH (telephone: 800-356-4674; web site: http://www.cdc.gov/niosh/homepage.html).

American Welding Society (AWS). *Fumes and Gases in the Welding Environment,* available from Global Engineering Documents, 15 Inverness Way East, Englewood, CO 80112-5776 (telephone: 800-854-7179; web site: www.global.ihs.com). American Conference of Governmental Industrial Hygienists (ACGIH). *Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices,* available from ACGIH, 1330 Kemper Meadow Drive, Cincinnati, OH 45240-1634 (telephone: 513-742-2020; web site: www.acgih.org).

Occupational Safety and Health Administration (OSHA). *Code of Federal Regulations,* Title 29 Labor, Parts 1910.1 to 1910.1450, available from the U.S. Government Printing Office, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954 (telephone: 800-321-6742; web site: www.osha.gov). American Conference of Governmental Industrial Hygienists (ACGIH). *Documentation of the Threshold Limit Values and Biological Exposure Indices,* available from ACGIH, 1330 Kemper Meadow Drive, Cincinnati, OH 45240-1634 (telephone: 513-742-2020; web site: www.acgih.org). IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, Chromium, Nickel, and Welding, Vol. 49 (1990), Oxford University Press, New York, NY 10016 (telephone: 212-726-6000; web site: www.oup-usa.org).

The following references include the specific precautionary methods used to protect against exposure to fumes and gases:

American National Standards Institute (ANSI). *Safety in Welding, Cutting, and Allied Processes* (ANSI Z49.1), available from Global Engineering Documents, 15 Inverness Way East, Englewood, CO 80112-5776 (telephone: 800-854-7179; web site: www.global.ihs.com).

National Institute for Occupational Safety and Health (NIOSH). *Safety and Health in Arc Welding and Gas Welding and Cutting,* NIOSH Publication No. 78-138. Cincinnati, OH (telephone: 800-356-4674; web site: http://www.cdc.gov/niosh).

Mine Safety and Health Administration (MSHA). *Code of Federal Regulations,* Title 30 Mineral Resources, Parts 1 to 199, available from the U.S. Government Printing Office, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954 (telephone: 202-693-9400; web site: www.msha.gov).

2% THORIATED ELECTRODE INTRODUCTION

Thoriated tungsten electrodes contain thorium, a radioactive material that can pose health and environmental risks at elevated exposure levels. Thorium is a low-level radioactive material that primarily emits alpha particles as well as some beta and gamma radiation. These electrodes are normally sharpened by grinding as part of the standard procedure while preparing to perform gas tungsten arc welding (GTAW). Dust particles from this grinding process can cause internal radiation exposure if the dust is accidentally ingested or inhaled, so caution is necessary. Concern regarding radiation exposure to the external body from these electrodes is minimal. Thoriated tungsten electrodes are widely used because they make good welds and are long lasting and quite easy to use. A thoriated tungsten electrode operates at a temperature well below its melting temperature compared to a pure tungsten electrode. This results in a much lower rate of consumption of the electrode during welding, which eliminates much of the "arc wander" associated with balled pure tungsten. Other reasons for their use include easier arc initiation, reduced weld metal contamination, higher current carrying capacity, the ability to sharpen the electrode, and long life.

IS THERE A CONCERN TO THE USER?

The risk of internal exposure during welding is negligible in most circumstances since the thoriated electrode is consumed at a very slow rate. During the grinding of the thoriated tungsten electrodes, radioactive dust is created, posing the potential hazard of internal radiation exposure by inhalation or ingestion unless care is taken to control the dust.

HOW TO REDUCE EXPOSURE

- Choose thorium-free tungsten electrodes such as those containing cerium, lanthanum, yttrium, or zirconium whenever possible.
- Read, understand, and follow all information in the Material Safety Data Sheet (MSDS) for the selected tungsten electrode.
- Use a high-efficiency dust collection system to capture particles created during the grinding of electrodes or disturbed during housekeeping.
- Evaluate the ventilation system before acceptance and periodically thereafter to minimize personnel and environmental contamination. AWS disclaims liability for any injury to persons or to property, or other damages of any nature whatsoever, whether special, indirect, consequential or compensatory, directly or indirectly resulting from the publication, use of, or reliance on this Safety and Health Fact Sheet. AWS also makes no guaranty or warranty as to the accuracy or completeness of any information published herein.
- Develop and implement standard operating procedures for the use of thoriated tungsten electrodes, including proper procedures for storage, grinding, use, housekeeping and disposal.
- Provide training in the operation of the welding and grinding equipment, personal hygiene, and safety.

WHAT TO DO WITH THE COLLECTED DUST PARTICLES

- Regularly remove the dust generated by grinding.
- Properly dispose of the dust and spent electrodes in accordance with federal, state, and local regulations.

SUMMARY

Several of the information sources listed indicate that the risk of occupational exposure to radiation during storage, handling, and welding with thoriated tungsten electrodes is negligible where simple precautions are taken. Special care should be taken to control and collect dust from grinding these electrodes in order to prevent a potential ingestion and inhalation exposure to radioactive dust particles resulting from this operation.

INFORMATION SOURCES

International Institute of Welding (IIW).

Statement from Commission VIII, Health and Safety 2000. *Welding with Non-Consumable Thoriated Tungsten*

Electrodes. Document IIW-VIII-1901-00. np: np. Jankovic, J. T., W. S. Underwood, and G. M. Goodwin. 1999. Exposures from Thorium Contained in Thoriated Tungsten Electrodes. *American Industrial Hygiene Journal* 60: 384 – 389.

Nuclear Regulatory Commission (NRC).

Code of Federal Regulations, Title 10 Energy, Part 40.13 (c) (1) (iii) (Available from the U.S. Government Printing Office, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954; tel: 800-321-6742; Web site: www.nrc.gov). Oak Ridge National Laboratory (ORNL):

Estimated Radiation Doses from Thorium and Daughters Contained in Thoriated Welding Electrodes, by L. M. McDowell-Boyer (ORNL/NUREG/TM-344). Oak Ridge, TN: ORNL, 1979. Sinclair, M. L., and K. S. Thind:

"Assessment of Thorium Exposure Due to Grinding of Thoriated Tungsten Electrodes." Paper presented at the

American Industrial Hygiene Conference, Boston, MA., May 1992, Breslin, A. J., and W. B. Harris: Use of

thoriated tungsten electrodes in inert gas shielded arc welding. *Ind. Hyg. Q. 13*:191-195 (1952). United States Nuclear Regulatory Commission. (February 1995). *Airborne Thorium from Welding Rods.* HPPOS-255 PDR-9308020142. U.S. NRC, Washington, DC. (Web site: www.nrc.gov).

API 5L-Grade B Steel (Mild)

Technical Specification Equivalents Mechanical Properties

API 5L-Grade B mechanical properties allows it to meet the specifications indicated and particularly has higher yield strengths to meet 350 mPa minimum when longitudinally tested. To conform to AS 1163 C350 LO, pipe must be longitudinally tested and also a pre-aged specimen test must be performed and these are Spec Test Certificates. Test Certificate may mean that the pipe does NOT comply with AS 1163 C350 LO.

TT DATA	Transverse Test Direction		Longitudinal Test Direction	
Test Data	Min Yield Strength (mPa)	Min Ultimate Tensile Strength (mPa)	Min Yield Strength (mPa)	Min Ultimate Tensile Strength (mPa)
API 5L Grade B	241	413	350	430

Chemical Composition

The tighter control on chemical composition during steel manufacturing allows the pipe to exhibit toughness properties beyond that normally experienced with standard API 5LB ERW pipe. The chemical composition is as follows:

% Element Maximum Limits				
Material	Carbon	Sulphur	Phosphorus	Carbon Equivilent
API 5L-Grade B	0.26	0.030	0.030	Not Measured

Dimensional Tolerances

Tolerances on outside diameter and wall thickness to allow it to comply to Standards. Wall thickness variation does not exceed.:t 10% which is significantly tighter than the.:t % allowed under the API and ASTM Standards, another feature which must be considered when comparing API 5L Grade B or X42.

Fracture Toughness

It is not normal in API 5L Grade B to provide V-Notch Charpy Test results, however API 5L-Grade B pipe is tested at 0°Centigrade to verify significantly improved fracture toughness results, thereby allowing it to be used at a lower design temperature when designing to AS 4041 than normally allowed for in API 5L Grade B.

Standard Size Range

Outside Diameter		Inside Diameter	
NFS	Inches	Inches	Schedule Number
5	5-9/16	.258-.750	40, 80 (XS), 120, 160, XXS
6	6-5/8	.280-.864	40, 80 (XS), 120, 160, XXS
8	8-5/8	.250-.906	20, 30, 40, 80 (XS), 100, 120, 140, 160, XXS
10	10-3/4	.307-1.000	30, 40, 60, (XH), 80, 100, 120, 140

Standard Grades

Internal Abbreviation	Specification	Grades
Dual	ASTM/ASME	A106B/SA106B, A53B/SA53B
Triple	API 5L, ASTM/ASME	GARDE B, A106B/SA106B, A53B/SA53B
Quad	API 5L, ASTM/ASME	GRADE X42, GRADE B,A106B/SA106B, A53B/SA53B
Quint	API 5L, ASTM/ASME	GRADE X42, GRADE B, A106B/SA106B, A106B/SA106C A53B/SA53B

ASTM Tensile Requirements

Specification & Grade	Yield Strength Min, psi	Yield Strength Min, psi
ASTM A106B	35,000	60,000
ASTM A106C	40,000	70,000
ASTM A333-GR.6[1]	35,000	60,000

Repair Procedures

Temporary or permanent repairs shall be made on all lines which have a leak, corrosion pitting or other imperfection, or that has received damage which in the judgement of the representative of the Gas Operator would endanger the public. When temporary repairs are deemed appropriate, permanent repairs shall follow as soon as possible.

On pipelines which operate above 40% of SMYS, any imperfection in the line should be repaired by cutting out a cylindrical piece of pipe. If this is not feasible, a full encirclement welded split sleeve shall be used to cover the imperfection. The pressure shall be reduced to less than 20% of SMYS during the welding operation. NOTE: Sleeve repair welds shall be repaired employing low hydrogen electrodes (E7018) or .30-.35 microwire GMAW employing a shielding gas (Argon/CO^2/Argon-Helium Mix). FCAW is not approved for pipeline facilities as of this recording. The electrode being employed shall not exceed more than 2 times the pipes tensile strength. Pipe that has a greater tensile strength than 35, 000 psi may be repaired using an 80 series electrode (E8018.)

Repairs to steel pipes which contain dents, gouges, grooves, arc burns or similar imperfections which have not resulted in a leak shall be made in accordance with 49 CFR 192.309, "Repair of Steel Pipe". If any of the imperfections result in a disturbance of the curvature of the pipe greater than 2% of the pipe diameter, it shall be removed by cutting out the damaged portion as a cylinder.

Repairs to welds shall be made in accordance with 49 CFR 192.245, "Repair or Removal of Defects", and 192.715, "Transmission Lines: Permanent Field Repair of Welds". When a weld is leaking, it shall be cut out, removed and replaced if the pipeline operates above 20% of SMYS. If it is to be repaired by grinding or by welding on an encirclement saddle, the pressure shall be reduced to less than 20% SMYS during the repair. If a weld is unacceptable under 49 CFR, 192.245©), it shall be removed or repaired. However, a weld that has a crack that is more than 8% of weld length must be removed and shall not be repaired. For each weld that requires repair, the metal shall be taken down to a visually clean (no porosity, no inclusions nor prior weld defects inside metal walls) area before welding can be completed. All welds shall be inspected by qualified personnel to ensure quality and acceptability. NOTE: Grinding for material removal shall be limited too an acceptable thickness of wall material remaining. Grinding pressure shall be held to a minimum so as to eliminate crystallization (scorching) of the metal.

Welding operation shall be protected from all inclement weather. Welds exposed to accelerated cooling of the hot filler metal may result in crystallization of the weld and may result in cracking.

Repair of a crack or any defect that resided in a previously repaired area must be removed and repaired according to written welding procedures. Removal of all crystalized and oxidized metal shall be removed and replaced by new steel (API-5L Grade.) See: Section #3, Welding Procedures.

Leaks due to corrosion may be repaired by using a bolt-on leak clamp or if the pipeline operates at less than 40% SMYS, by fillet welding a steel plate patch over the pit within the limitation prescribed in 49 CFR 192.717, "Transmission Lines: Permanent Field Repair of Leaks", (a)(3). NOTE: Welds must be performed by a qualified welder according to the operator's written welding procedures as described in CFR 49, Subpart E, 192.225, 227(b), 229(a)(b)(1)(ii) Welding of Steel in Pipeline.

Any line disconnected must be installed or re-installed in accordance with manufacturer's installation

instructions within the limits prescribed by the latest edition of 49 CFR Part 192. All lines connected must be pressured tested in accordance with service line testing procedures.

Low Hydrogen Welding

Consideration shall be given to the use of low hydrogen electrodes during welding on live (flowing gas) steel pipelines where the temperatures may be degraded and prohibit adequate heat to reside in the pipe wall during weld penetration. Pipelines remaining in service shall be in compliance of 49 CFR 192.245, Guide Material #4.

Qualification of Welding Procedures

Before production welding is started, a detailed procedure specification shall be established and qualified to demonstrate that welds with suitable mechanical properties (such as strength, ductility, and hardness) and soundness can be made by the procedure. The quality of the welds shall be determined by destructive testing. These procedures shall be adhered to except where a change is specifically authorized by the operator, as provided for in Section 5.4. of the API Standard 1104, 20th Edition, API Std 1104, Errata 2.2008..

The details of each qualified procedure shall be recorded to show the results of the qualifying test. NOTE: The procedures shall be maintained as long as the procedure is in use.

Qualification of Welders

The purpose of the welder qualification test is to determine the ability of welders to make sound butt or fillet welds

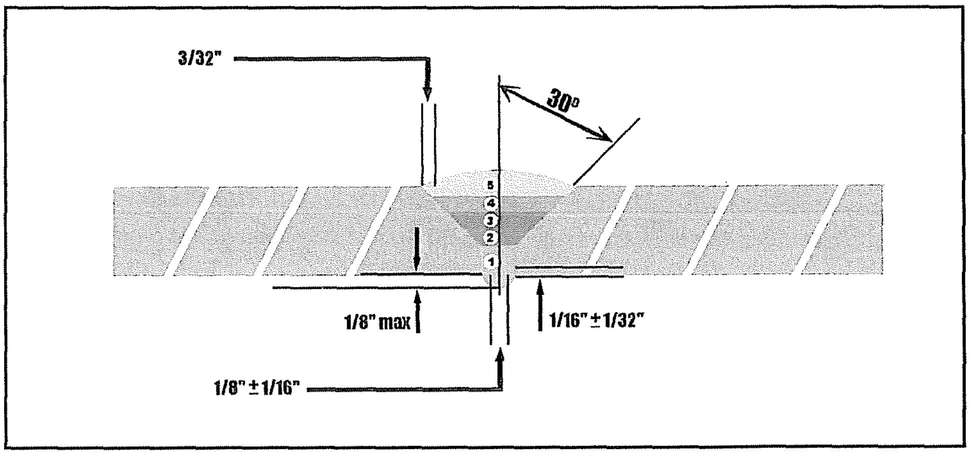
using previously qualified procedures. Before any production welding is performed, welders shall be qualified according to the applicable requirements of 6.2 through 6.8. It is the intent of this standard that a welder who satisfactorily completes the procedure qualification test is a qualified welder, provided the number of test specimens required by 6.5 have been removed, tested, and meet the acceptance criteria of 5.6, for each welder. Prior to starting the qualification tests, the welder shall be allowed reasonable time to adjust the welding equipment to be used. The welder shall use the same welding technique and proceed with the same speed he will use if he passes the test and is permitted to do production welding. The qualification of welders shall be conducted in the presence of a representative acceptable to the operator. A welder shall qualify for welding by performing a test on segments of pipe nipples or on full-size pipe nipples, as specified in 6.2.1. When segments of pipe nipples are used, they shall be supported so that typical flat, vertical, and overhead welds are produced. NOTE: Exacting welder qualifications are detailed in 6.2.2 and 6.3.2 of the API Standard 1104, 20th Edition, API Std 1104, Errata 2.2008.

A welder may qualify to perform welding on pipe to be operated at a pressure that produces a hoop stress of less than 20% of SMYS by performing a test weld, for that process used. Section I of Appendix C of this part, each welder who is to weld service line connections to a mainline pipe must successfully test under Section II of Appendix C as required for qualification of welders. Welders qualifying under 192.227(b) shall be re-tested each calendar year. A welder must have welded using the current welding procedures within the previous 6 months to retain current welding qualifications under the current testing exercise. **NOTE:** If the welder has not demonstrated welding skills within the previous 6 months, the welder must complete successful re-testing prior to welding on a pipeline facility.

STANDARD PROCEDURE SPECIFICATION Shielded Metal Arc Weld Steel Pipe (X42) API 1104 (12" Butt)	
Process	SMAW
Material	X-42
Diameter/Wall Thickness	12.75" x 0.375"
Joint Design	37° bevel angle, root opening 1/16", 1/16" land
Filler Metal/Number of Beads	1/8" E6010 electrode (2-beads and 1/8" cover bead)
Electrical/Flame Characteristics	1/8" electrode, 100-160 amps, 20-26 volts
Position	Horizontal Fixed
Direction of Welding	Downhill
Number of Welders	One
Time Lapse Between Passes	5 minutes
Time Per Pass/Start-Stop	45 minutes
Type of Line-up Clamp	External
Removal of Line-up Clamp	After 50% of stringer or root is finished
Cleaning	Power Grinder as to remove all slag and defects
Preheat, Stress Relief	None
Shield Gas/Flow Rate	None
Shielding Flux	Cellulose Sodium
Travel Speed	Drag bead 10-18" per/minute, weave 4-10" per/minute
Sketches/Tabulations (attachable)	N/A

Tested	09/11/2009	Welder	Angelo Fonzo/ID# 6029
Approved	**Danny Spencer**	Weld Adm	Danny Spencer
Adopted		CWI	

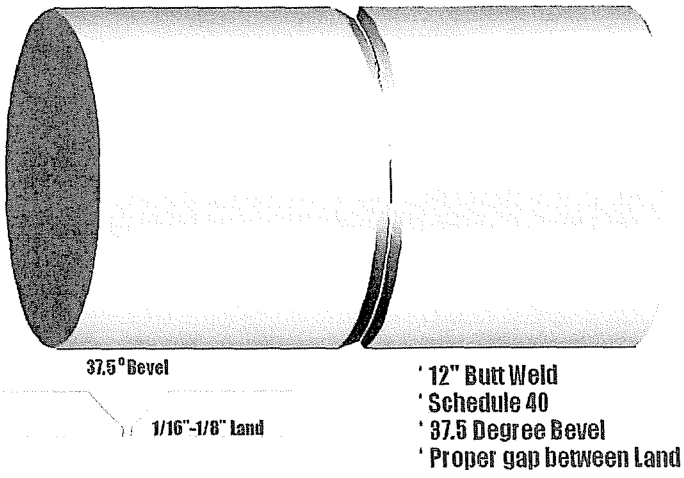
WELDING PROCEDURE DETAIL SHEET METAL ARC WELDING OF STEEL PIPE API STANDARD 1104 (12" Butt)



Pipe Diameter: 12.75" **Grade: X-42**
Wall Thickness: 0.375" **Position: Vertical**

Bead #	Elec/Size	Amps	Volts	Polarity	Gas	CFH	Position	Direction	IPM	Filler
1	1/8"	100-160	20-26	DCRP	N/A	N/A	Vertical	Downhill	10-18"	E6010
2	1/8"	100-160	20-26	DCRP	N/A	N/A	Vertical	Downhill	10-18"	E6010
3	1/8"	100-160	20-26	DCRP	N/A	N/A	Vertical	Downhill	10-18"	E6010
4	1/8"	100-160	20-26	DCRP	N/A	N/A	Vertical	Downhill	10-18"	E6010
5	1/8"	100-160	20-26	DCRP	N/A	N/A	Vertical	Downhill	10-18"	E6010

REMARKS



COUPON TEST REPORT

API 1104 (12" Butt Weld)

TEST PROCEDURE	**API 1104 Procedural Qualification**	X	**Metal Arc**	X

Welding Time	45 minutes	**Time of Day**	1000 hrs.	**Temperature**	68°F
Weather Conditions	N/A	**Wind Break Used**	N/A		
Make Welding Equipment	Lincoln 275	**Size**	275		
Amperage	100-160	**Voltage**	20-26		
Make of Electrode	Lincoln Fleetweld	**Reinforcement**	N/A		
Pipe Manufacture	U.S.S.	**Pipe Spec**	X-42	**Pipe Diameter**	12.750" OD
Wall Thickness	.375"	**WT/FT**	33.38	**Joint Length**	40"

Size of Electrode	1/8"	1/8"	1/8"	1/8"
Classification Electrode	E6010+	E6010+	E6010+	E6010+
Coupon Stenciled	2 O'Clock	4 O'Clock	8 O'Clock	10 O'Clock
Original Diameter/Plate	1.0"	1.0"	1.0"	1.0"
Original Area Sq-In	0.188"	0.188"	0.188"	0.188"
Maximum Load			N/A	N/A
Tensile Stress/Inches			N/A	N/A
Fracture Location				

Max. Tensile		**Min. Tensile**		**Avg. Tensile**	

REMARKS CONCERNING TESTING

ROOT BEND		**FACE BEND**		**TENSILE**		**NICK BREAK**	
1		**1**		**1**		**1**	
2		**2**		**2**		**2**	
3		**3**		**3**		**3**	
4		**4**		**4**		**4**	

QUALIFYING TEST	X	**PROCEDURE**	X	**QUALIFIED**	X
LINE TEST		**WELDER**	X	**DISQUALIFIED**	

Qualification Site	Memphis State Technical Testing/Welding Lab	**Date**	08/22/2009
Tested By	**Danny Spencer**	**Administrator**	D. Spencer

COUPON TEST REPORT

API 1104 (12" Butt Weld)

TEST PROCEDURE	**API 1104 Procedural Qualification**	X	**Metal Arc**	X

Welding Time	45 minutes	**Time of Day**	1000 hrs.	**Temperature**	68°F

Weather Conditions	N/A	**Wind Break Used**	N/A
Make Welding Equipment	Lincoln 275	**Size**	275
Amperage	100-160	**Voltage**	20-26
Make of Electrode	Lincoln Fleetweld	**Reinforcement**	N/A

Pipe Manufacture	U.S.S.	**Pipe Spec**	X-42	**Pipe Diameter**	12.750" OD
Wall Thickness	.375"	**WT/FT**	33.38	**Joint Length**	40"

Size of Electrode	1/8"	1/8"	1/8"	1/8"
Classification Electrode	E6010+	E6010+	E6010+	E6010+
Coupon Stenciled	2:00 Tensile	4:00 Tensile	8:00 Tensile	10:00 Tensile
Original Diameter/Plate	1.00"	1.0"	1.0"	1.0"
Original Area Sq-In	0.219'	0.219'	0.219'	0.219'
Maximum Load	21,000	21,000	21,000	20,000
Tensile Stress/Inches	95,900	95,900	95,900	91,300
Fracture Location	Pipe	Pipe	Pipe	Pipe
Coupon Stenciled	2:00 Nick Break	4:00 Nick Break	8:00 Nick Break	10:00 Nick Break
Orig. Diameter of Plate	0.75"	0.75"	0.75"	0.75"
Orig. Area Square Inch	0.164	0.164	0.164	0.164
Maximum Load	16,000	16,500	16,000	15,000
Tensile Stress/Inches	97,600	100,600	97,600	91,500
Fracture Location	Weld	Weld	Weld	Weld

Max. Tensile	95,900	**Min. Tensile**	91,300	**Avg. Tensile**	94,750

REMARKS CONCERNING TESTING

ROOT BEND		**FACE BEND**		**TENSILE**		**NICK BREAK**	
1	OK	1	OK	1	OK	1	OK
2	OK	2	OK	2	OK	2	OK
3	OK	3	OK	3	OK	3	OK
4	OK	4	OK	4	OK	4	OK

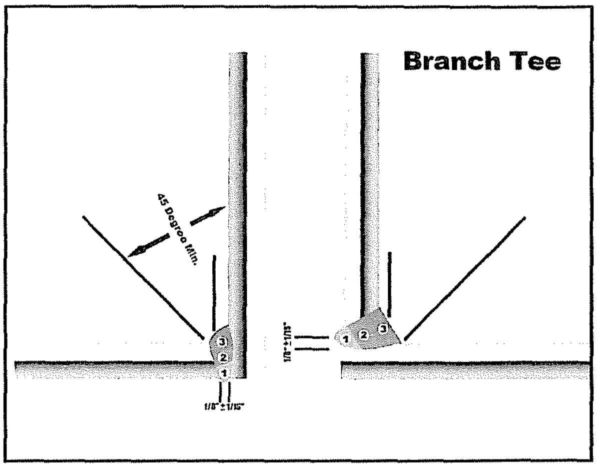
QUALIFYING TEST	X	**PROCEDURE**	X	**QUALIFIED**	X
LINE TEST		**WELDER**	X	**DISQUALIFIED**	

Qualification Site	Memphis State Technical Testing/Welding Lab	**Date**	09/11/2009
Tested By	**Danny Spencer**	**Administrator**	D. Spencer

STANDARD PROCEDURE SPECIFICATION Metal Arc Weld Steel Pipe & Fittings Branch Saddle Tee (X42) API 1104	
Process	SMAW
Material	X-42
Diameter/Wall Thickness	12.75" x 0.25"
Joint Design	37° bevel angle, root opening 1/16", 1/16" land
Filler Metal/Number of Beads	1/8" E6010 electrode (2-beads and 1/8" cover bead)
Electrical/Flame Characteristics	1/8" electrode, 100-160 amps, 20-26 volts
Position	Horizontal Fixed
Direction of Welding	Downhill
Number of Welders	One
Time Lapse Between Passes	5 minutes
Time Per Pass/Start-Stop	45 minutes
Type of Line-up Clamp	External
Removal of Line-up Clamp	After 50% of stringer or root is finished
Cleaning	Power Grinder as to remove all slag and defects
Preheat, Stress Relief	None
Shield Gas/Flow Rate	None
Shielding Flux	Cellulose Sodium
Travel Speed	Drag bead 10-18" per/minute, weave 4-10" per/minute
Sketches/Tabulations (attachable)	

Tested	08/25/2009	Welder	Angelo Fonzo/ID # 6029
Approved	Danny Spencer	Weld Adm	Danny Spencer
Adopted		CWI	

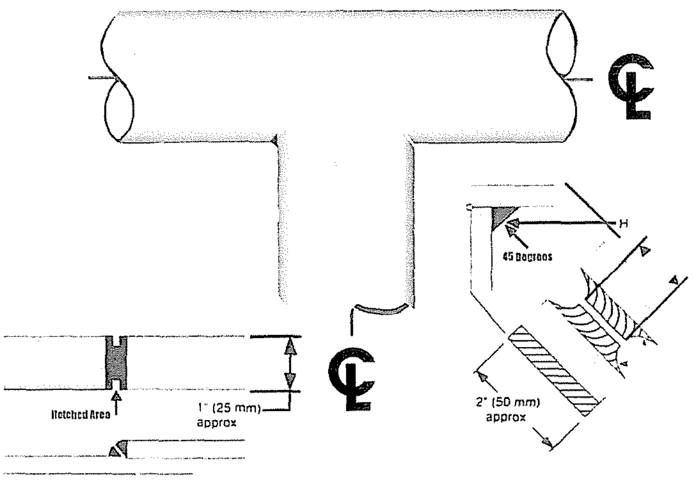
WELDING PROCEDURE DETAIL SHEET METAL ARC WELDING OF STEEL
Metal Arc Weld Steel Pipe & Fittings Branch Saddle Tee (X42) API 1104



Pipe Diameter: 12.75" **Grade: X-42**
Wall Thickness: 0.250" **Position: Vertical**

Bead #	Elec/Size	Amps	Volts	Polarity	Gas	CFH	Position	Direction	IPM	Filler
1	1/8"	100-160	20-26	DCRP	N/A	N/A	Vertical	Downhill	10-18"	E6010
2	1/8"	100-160	20-26	DCRP	N/A	N/A	Vertical	Downhill	10-18"	E6010
3	1/8"	100-160	20-26	DCRP	N/A	N/A	Vertical	Downhill	10-18"	E6010
4	1/8"	100-160	20-26	DCRP	N/A	N/A	Vertical	Downhill	10-18"	E6010
5	1/8"	100-160	20-26	DCRP	N/A	N/A	Vertical	Downhill	10-18"	E6010

REMARKS



COUPON TEST REPORT

API 1104 (12" Tee Weld)

TEST PROCEDURE	API 1104 Procedural Qualification	X	Metal Arc	X

Welding Time	45 minutes	Time of Day	1000 hrs.	Temperature	68°F

Weather Conditions	N/A	Wind Break Used	N/A
Make Welding Equipment	Lincoln 275	Size	275
Amperage	100-160	Voltage	20-26
Make of Electrode	Lincoln Fleetweld	Reinforcement	N/A

Pipe Manufacture	U.S.S.	Pipe Spec	X-42	Pipe Diameter	12.750" OD
Wall Thickness	0.250"	WT/FT	33.38	Joint Length	40"

Size of Electrode	1/8"	1/8"	1/8"	1/8"
Classification Electrode	E6010+	E6010+	E6010+	E6010+
Coupon Stenciled	90° to crotch nick-break	90° to crotch nick-break	90° to crotch nick-break	90° to crotch nick-break
Original Diameter/Plate	1.0"	1.0"	1.0"	1.0"
Original Area Sq-In	0.75"	0.75"	0.75"	0.75"
Maximum Load	N/A	N/A	N/A	N/A
Tensile Stress/Inches	N/A	N/A	N/A	N/A
Fracture Location				

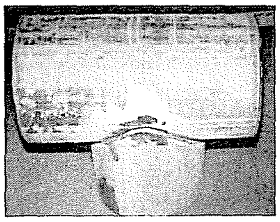
Max. Tensile		Min. Tensile		Avg. Tensile	

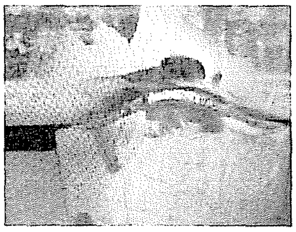
REMARKS CONCERNING TESTING

Remarks on Nick-Break 90° to Crotch		Remarks on Nick-Break to Crotch	
1		5	
2		6	
3			
4			

QUALIFYING TEST	X	PROCEDURE	X	QUALIFIED	X
LINE TEST		WELDER	X	DISQUALIFIED	

Qualification Site	Memphis State Technical Testing/Welding Lab	Date	08/25/2009
Tested By	Danny Spencer	Administrator	D. Spencer

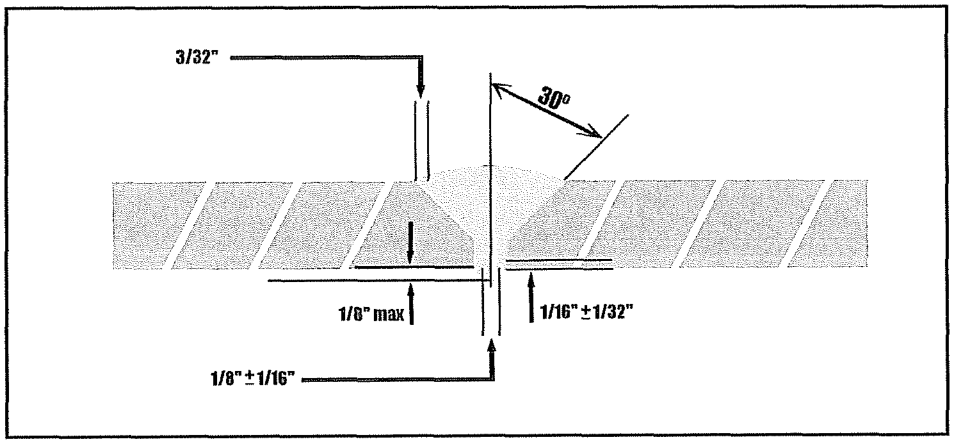




Shielded Metal Arc Weld Steel Pipe & Fittings Branch Saddle Tee	
Process	Manual Arc (SMAW)
Material	API 5L X-42
Diameter/Wall Thickness	2.500" OD/0.188" WT
Joint Design	37° bevel angle, root opening 1/16", 1/16" land
Filler Metal/Number of Beads	1/8" E6010 Electrode, 1-bead and 1/8" covered bead
Electrical/Flame Characteristics	1/8" Electrode, 100-160 amps, 20-26 volts
Position	Horizontal Fixed
Direction of Welding	Downhill
Number of Welders	One
Time Lapse Between Passes	5 minutes
Time Per Pass/Start-Stop	20 minutes
Type of Line-up Clamp	External
Removal of Line-up Clamp	After 50% of stringer or root is finished
Cleaning	Power grinder remover all slag and defects
Preheat, Stress Relief	None
Shield Gas/Flow Rate	None
Shielding Flux	Cellulose Sodium
Travel Speed	Drag bead 10-18" per/minute, weave 4-10"
Sketches/Tabulations (attachable)	

Tested	06/10/2009	Welder	Johnny Enoch/ID # 7420
Approved	**Danny Spencer**	Weld Adm	Danny Spencer
Adopted		CWI	

WELDING PROCEDURE OXY-ACETYLENE WELDING OF STEEL PIPE

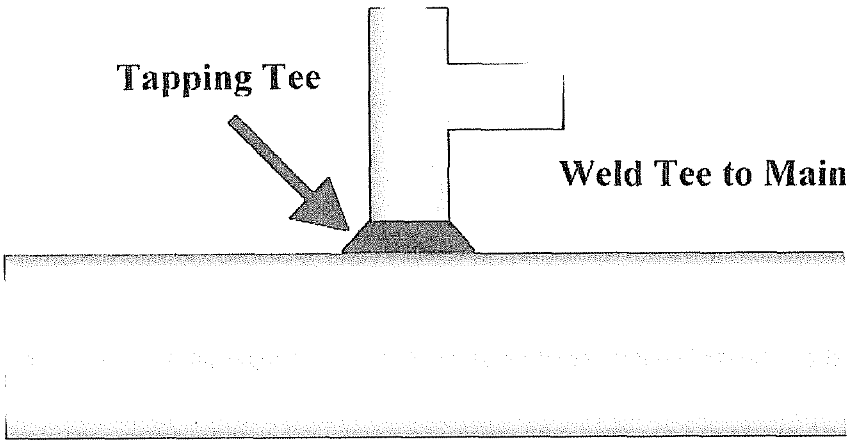


Pipe Diameter: 2.500"
Wall Thickness: 0.188"

Grade: X-42
Position: Vertical

Bead #	Elec/Size	Amps	Volts	Polarity	Gas	CFH	Position	Direction	IPM	Filler
1	1/8"	100-160	20-26	DCRP	N/A	N/A	Vertical	Downhill	10-18	E6010
2	1/8"	100-160	20-26	DCRP	N/A	N/A	Vertical	Downhill	10-18	E6010

REMARKS



COUPON TEST REPORT

D. O. T. APPENDIX C, PART I, II SMAW

TEST PROCEDURE	**DOT Appendix "C"**	X	**Metal Arc**	X

Welding Time	20 minutes	**Time of Day**	1830 hrs.	**Temperature**	72°F
Weather Conditions	N/A	**Wind Break Used**	N/A		
Make Welding Equipment	Lincoln 275	**Size**	275		
Amperage	100-160	**Voltage**	20-26		
Make of Electrode	Lincoln Fleetweld	**Reinforcement**	N/A		
Pipe Manufacture	U.S.S.	**Pipe Spec**	X-42	**Pipe Diameter**	2.500" OD
Wall Thickness	0.188"	**WT/FT**	8.643	**Joint Length**	40"

INSPECTION "KNOCK-OFF" 3/4" TEE TO 2" MAIN

VISUAL	Successful
LEAK TEST	Successful
KNOCK-OFF	Successful

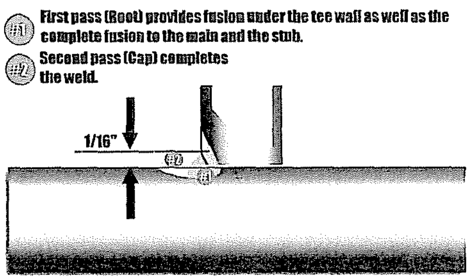
BUTT WELD/FIXED

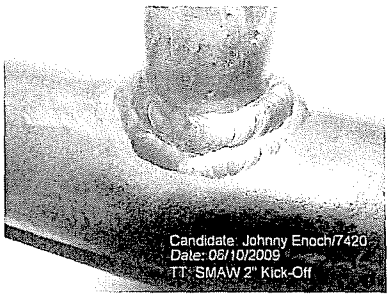
Coupon Stenciled	**2 O'Clock**	**4 O'Clock**	**8 O'Clock**	**10 O'Clock**
Original Diameter/Plate	1.0"	1.0"	1.0"	1.0"
Original Area Sq-In	0.188"	0.188"	0.188"	0.188"
ROOT BEND				

REMARKS ON ROOT BEND TEST

QUALIFYING TEST	X	**PROCEDURE**	X	**QUALIFIED**	X
LINE TEST		**WELDER**	X	**DISQUALIFIED**	

Qualification Site	Memphis State Technical Testing/Welding Lab	**Date**	06/10/2009
Tested By	**Danny Spencer**	**Administrator**	D. Spencer

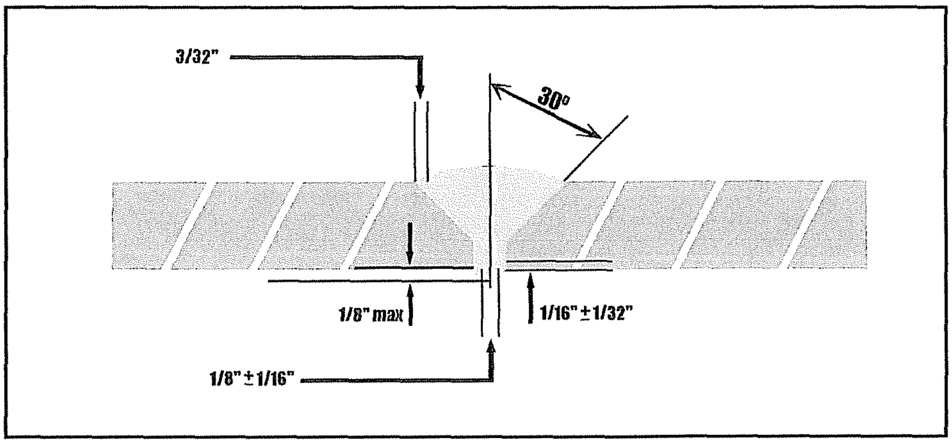




STANDARD PROCEDURE SPECIFICATION Oxygen-Acetylene Welding of Carbon Steel Pipe	
Process	Oxy-Acetylene Forehand
Material	API 5L X-42
Diameter/Wall Thickness	2.375" (0.154")
Joint Design	37° bevel angle, root opening 1/16", 1/16" land
Filler Metal/Number of Beads	1/8" #32 (single pass/single bead)
Electrical/Flame Characteristics	Neutral Flame (6000°F)
Position	Horizontal Fixed
Direction of Welding	Uphill
Number of Welders	One
Time Lapse Between Passes	None
Type of Line-up Clamp	External
Removal of Line-up Clamp	Removal post (3) tack welds
Cleaning	Hand tools
Preheat, Stress Relief	None
Shield Gas/Flow Rate	4.14628368 cubic feet per hour
Shielding Flux	None
Travel Speed	1" - 2" per/minute
Sketches/Tabulations (attachable)	

Tested	06/10/2009	Welder	Johnny Enoch/ID # 7420
Approved	Danny Spencer	Weld Adm	Danny Spencer
Adopted		CWI	

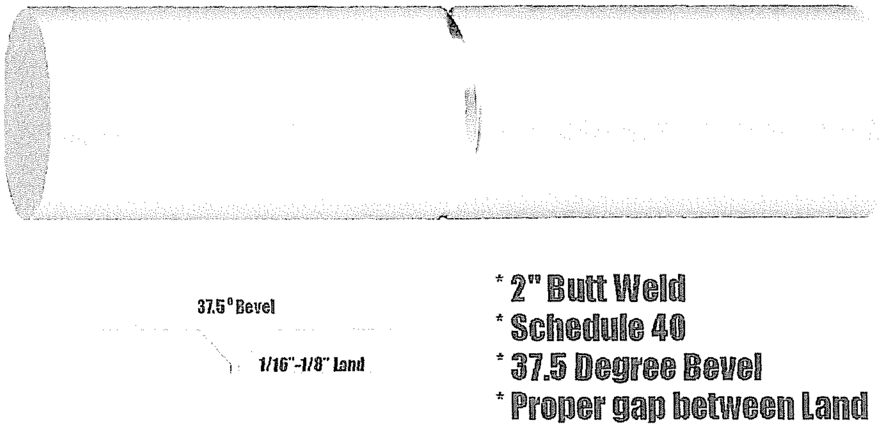
WELDING PROCEDURE OXY-ACETYLENE WELDING OF STEEL PIPE



Pipe Diameter: 2.375" **Grade: X-42**
Wall Thickness: 0.154" **Position: Vertical**

Bead #	Elec/Size	Amps	Volts	Polarity	Gas	CFH	Position	Direction	IPM	Filler
1	1/8"	N/A	N/A	N/A	Oxy-Acet	N/A	Vertical	Uphill	1-2"	1/8" mild

REMARKS



* 2" Butt Weld
* Schedule 40
* 37.5 Degree Bevel
* Proper gap between Land

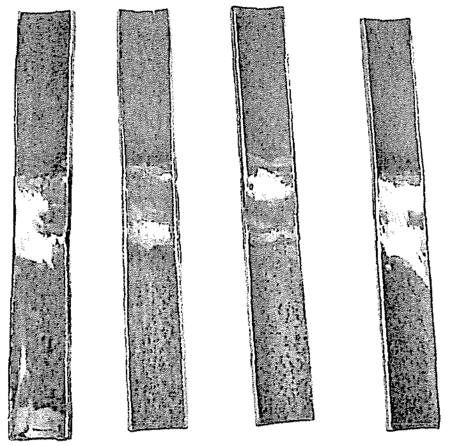
QUALIFYING PROCEDURE DESTRUCTIVE TEST

API STANDARD 1104 Oxy-acetylene

ALL TEST COUPONS OXY-ACETYLENE AND MANUAL ARC WELDING TESTS ARE TAKEN FROM THE FOLLOWING POSITIONS			
2 O'CLOCK	4 O'CLOCK	8 O'CLOCK	10 O'CLOCK

PIPE SIZE, OUTSIDE DIAMETER-INCHES			NUMBER OF SPECIMENS		
WALL THICKNESS ½ INCH AND LESS					
SIZE	TENSILE	NICK BREAK	ROOT BEND	FACE BEND	TOTAL
Under 2-3/8"	0	2	2	0	4
2-3/8" ↔ 4-1/2"	0	0	4	0	4
4-1/2" ↔ 12-3/4"	2	2	1	1	6
over 12-3/4"	4	4	2	2	12
WALL THICKNESS ½ INCH AND GREATER					
4-1/2" and less	0	2	2	0	4
4-1/2" ↔ 12-3/4"	2	2	1	1	6
over 12-3/4"	4	4	2	2	12

Candidate: Johnny Enoch/7420
Date: 06/10/2009
TT: Oxy-acetylene 2" 6G Pipe API 5L-Grade B

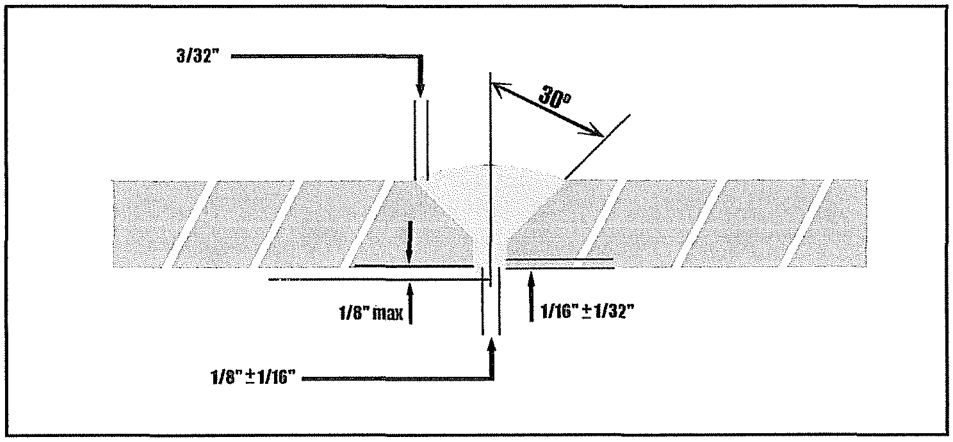


STANDARD PROCEDURE SPECIFICATION
Oxygen-Acetylene Welding **Weld Steel Pipe & Fittings Branch Saddle Tee**

Process	Oxy-Acetylene Forehand
Material	X-42
Diameter/Wall Thickness	2.375" (0.154")
Joint Design	37° bevel angle, root opening 1/16", 1/16" land
Filler Metal/Number of Beads	1/8" #32 (single pass/single bead)(2)
Electrical/Flame Characteristics	Neutral Flame (6000°F)
Position	Horizontal Fixed
Direction of Welding	Horizontal
Number of Welders	One
Time Lapse Between Passes	None
Type of Line-up Clamp	External
Removal of Line-up Clamp	Removal post (3) tack welds
Cleaning	Hand tools
Preheat, Stress Relief	None
Shield Gas/Flow Rate	4.14628368 cubic feet per hour
Shielding Flux	None
Travel Speed	1" - 2" per/minute
Sketches/Tabulations (attachable)	

Tested	06/10/2009	Welder	Johnny Enoch/ID # 7420
Approved	**Danny Spencer**	Weld Adm	Danny Spencer
Adopted		CWI	

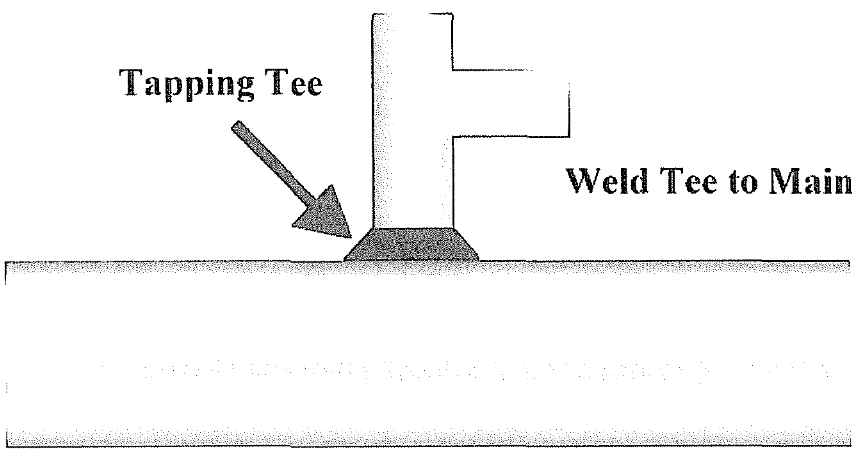
WELDING PROCEDURE OXY-ACETYLENE WELDING OF STEEL PIPE & FITTINGS BRANCH SADDLE TEE



Pipe Diameter: 2.375" | **Grade: X-42**
Wall Thickness: 0.154" | **Position: Vertical**

Bead #	Elec/Size	Amps	Volts	Polarity	Gas	CFH	Position	Direction	IPM	Filler
1	1/8"	N/A	N/A	N/A	Oxy-Acet	N/A	Vertical	Uphill	1-2"	1/8" mild
2	1/8"	N/A	N/A	N/A	Oxy-Acet	N/A	Vertical	Uphill	1-2"	1/8" mild

REMARKS



COUPON TEST REPORT

API STANDARD 1104 Oxy-acetylene Branch Fittings Saddle Tee

Welding Time	20 minutes	**Time of Day**	1315 hrs.	**Temperature**	72°F
Weather Conditions	N/A			**Wind Break Used**	N/A
Make Welding Equipment	Victor			**Size**	Injector
Amperage	N/A			**Voltage**	N/A
Make of Electrode	#32 Oxweld			**Reinforcement**	N/A
Pipe Manufacture	U.S.S.	**Pipe Spec**	X-42	**Pipe Diameter**	2.375" OD
Wall Thickness	0.154"	**WT/FT**	3.65	**Joint Length**	12"

INSPECTION "KNOCK-OFF" 3/4" TEE TO 2" MAIN

VISUAL	Successful
LEAK TEST	Successful
KNOCK-OFF	Successful

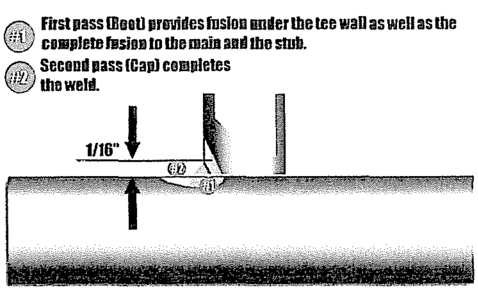
BUTT WELD/FIXED

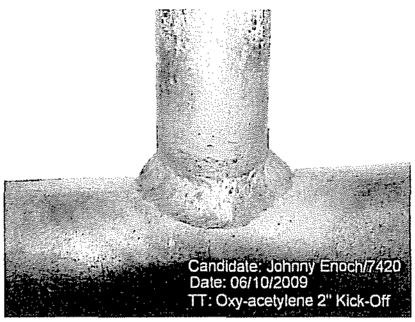
Coupon Stenciled	2 O'Clock	4 O'Clock	8 O'Clock	10 O'Clock
Original Diameter/Plate	1.0"	1.0"	1.0"	1.0"
Original Area Sq-In	0.154"	0.154"	0.154"	0.154"
ROOT BEND				

REMARKS ON ROOT BEND TEST

QUALIFYING TEST	X	**PROCEDURE**	X	**QUALIFIED**	X
LINE TEST		**WELDER**	X	**DISQUALIFIED**	

Qualification Site	Memphis State Technical Testing/Welding Lab	**Date**	06/10/2009
Tested By	**Danny Spencer**	**Administrator**	D. Spencer





OPERATING AND MAINTENANCE PROCEDURES

FOR THE NATURAL GAS SYSTEM OF

TOMPKINSVILLE NATURAL GAS

APPROVED BY:

______________________	____________
Executive Administrator	Date
______________________	____________
Administrator	Date
______________________	____________
Administrator	Date
______________________	____________
Administrator	Date
______________________	____________
Administrator	Date
______________________	____________
Administrator	Date

PREFACE

This manual mandates operating, maintenance and emergency procedures for the Tompkinsville Natural Gas. All responsible personnel shall be trained in the procedures contained within this manual for the sole purpose of performing at the highest level obtainable.

The appropriate personnel shall review these procedures on an annual basis, not to exceed fifteen months. If revisions are necessary, new copies of this manual will be distributed. All issues beyond the gas meter shall be deemed as customer owned. Customer owned facilities shall be governed by the National Fuel Gas Code. All code issues shall be observed and inspected based on code compliance and safety by the authority having jurisdiction. That entity shall be recognized as Tompkinsville Natural Gas.

TABLE OF CONTENTS

TITLE	SECTION

100 OPERATING PROCEDURES

101 Pressure Limitations

The Gas Operator shall assess the pressure limitations of all segments of the gas distribution system and shall maintain up-to-date records and maps of the system. These limitations shall be based on class location, design, construction tests, condition and history of the piping and shall comply with all applicable codes. Periodic reviews of the above criteria shall be conducted to insure that the limitations are sufficient. Operating pressures of the Gas System shall be classified and defined as follows:

Classification	Expression (Pressure)	Pressure	Classification	Expression (Pressure)	Pressure
SP	Standard	0-1 psig	HP	High Pressure	61-99.9 psig
IP	Intermediate	1-30 psig	XHP	Extra High	100-399 psig
MP	Medium	31-60 psig	XXHP	Extra Extra High	400-900 psig

The Systems Operator shall operate the system in such a manner that operating pressures throughout the system conform to the criteria established by the Gas Operator.

Class Location Studies

Annual class-location studies shall be used to determine the density of residential buildings within distances of their underground natural gas lines. These density investigations are used to calculate and set pipeline pressures for public safety. As residential building density increases, line pressures must be reduced, strengthened or removed. MAOP shall be lowered in the event the study reflects a density increase.

Communities, neighborhoods, homes and business require notifications and brochures to be sent with important information about natural gas safety to anyone who has a home or business located within about 2,000 feet of a gas transmission pipeline.

Review of records, monitoring and survey, and tests of pipelines throughout the entire gas pipeline system.

Actions to improve the safety and operations of the natural gas system are as follows:

1. Reduce the pressure on pipelines that had not been pressure tested.
2. Conduct a ground survey of the entire natural gas pipeline system.
3. Launch detailed pressure test records review and validation.
4. Share detailed information with public officials, emergency response agencies and customers about the locations of our pipelines.
5. Enlisted industry experts to consult on risk management and pipeline integrity assessment.
6. Pressure test pipeline segments.
7. Conduct a comprehensive internal review of operating practices.
8. Monitor locate, mark and dig requirements.
9. Notified all customers of their proximity to gas pipelines.
10. Conduct practice drills with first responders.

Pressure reduction can impact the ability to provide service to its customers on cold days when demand increases. Reduced pressure with increased demand could result in outages. In a worst case scenario where outages can be widespread, it could take days, weeks, maybe even months for restoration of service and relight of all pilot lights for customers.

Four key initiatives to strengthen the natural gas system:

Pipeline Modernization: Strength testing all pipe segments (including those previously exempted by federal regulations), replacing segments that should be replaced, and retrofitting pipelines to allow for inspections.

Valve Automation: Expand the use of automated valves to isolate and minimize damage if any pipeline ruptures do occur and enhance electronic monitoring of the gas system to identify operational issues and prevent or quickly locate pipeline ruptures

Pipeline Records Integration: Transition away from traditional paper records and consolidating all of its gas pipeline data into an integrated electronic data management system to provide integrity of system operations, maintenance, inspections and regulatory compliance.

Interim Safety Enhancements: Immediate steps to enhance the safety prior to completing the work proposed within the plan.

Maximum Allowable Operating Pressure

The pipeline requires the operator must establish a Maximum Allowable Operating Pressure, or MAOP, for all pipeline systems. MAOP includes a wide margin of safety and is set at a fraction of the pipe's calculated strength, which is the minimum pressure at which the pipe is expected to begin deforming (stretch the circumference.) An example, the MAOP for pipelines in areas with more than 45 homes within 220 yards per linear mile on either side of the pipeline is set at no more than 50% of SMYS.

MAOP is determined by one of three ways. ❶ MAOP can be determined by calculating the Specified Minimum Yield Strength, or SMYS, of the pipe. SMYS is the minimum pressure at which the pipe is expected to begin deforming (stretching the pipes circumference.) MAOP is then set at a fraction of the SMYS, thus allowing for a wide safety of margin. For example, MAOP is 50 percent or less for a pipeline in a more populated area. ❷ MAOP can be set based upon pressure tests, where MAOP is set safely below the pressures used in the pressure test. ❸ for pipe installed years ago, the MAOP can be based upon the pressure at which the pipeline has operated safely for 5 years. (Consecutive years surveyed.)

Federal requirements that pipeline operators establish MAOP for each section of pipeline or each distinct segment of a gas pipeline system.

Class Location Report

Federal and state regulations mandate the design criteria, the class designation of a pipeline is based on the types of buildings, population density, or level of human activity near the segment of pipeline, and is used to determine the pipeline's maximum allowable operating pressure ("MAOP").

Pipelines are rated Class 1 to Class 4, based on increasing level of population. Class 1 being the lowest population/consequence (10 residences or businesses per mile of pipeline), Class 3 and 4 being the highest (Class 3 is 46 or more homes or businesses per mile, and Class 4 is an urban area where buildings of four or more stories are prevalent).

The Systems Operator shall operate the system in such a manner that operating pressures throughout the system conform to the criteria established by the Gas Operator. **Tompkinsville shall be identified as a Class III location.**

<u>All facilities shall be designed, constructed, operated and repaired as per Class III or Class IV requirements as applicable, in accordance with the latest edition of 49 CFR Part 192.5, "Class Locations"</u>.

Tompkinsville Gas Systems are supplied by Texas Eastern Gas. The City Gate Station currently reduce pressures from the suppliers ranging from 300 psig to 250 psig and delivers a distribution pressure from 60 psig to 42 psig at all border/district regulator stations. The Tompkinsville system operates at less than 20% of SMYS. The MAOP establishment design criteria shall be noted and accepted under CFR 49, 192.619(a)(3), which so states, (3) The highest actual operating pressure to which the segment was subjected during the 5 years preceding July 1, 1970. The MAOP of the Tompkinsville gas distribution system is so established prior to 1970. All test criteria performed after 1970 tested at 1/1/2 times the operating pressure for 24 hrs. The city's gas distribution systems shall operate not in excess of the established Maximum Allowable Operating Pressure for each system. The regulator stations shall be identified as follows:

STATION NAME	1st Cut	2nd Cut	3rd Cut	4th Cut	MAOP
Texas Eastern (Gate Station)(Left Run)	**265 psig**	**45 psig**			**49 psig**
Texas Eastern (Gate Station)(Right Run)	**265 psig**	**43 psig**			**49 psig**
Scott's Rock Quarry (Right Run)	**265 psig**	**49 psig**			**49psig**
Scott's Rock Quarry (Left Run)	**265 psig**	**49 psig**			**49 psig**
Poplar Log Rd. (Worker)	**255 psig**	**44 psig**			**49 psig**
Poplar Log Rd. (Left Run)(Monitor)	**255 psig**	**52 psig**			**60 psig**
Poplar Log Rd. (Right Run)(Worker)	**255 psig**	**44 psig**			**49 psig**
Poplar Log Rd. (Right Run)(Monitor)	**255 psig**	**50 psig**			**60 psig**
Green Hills Station 1st Cut	**265 psig**	**149 psig**			**150 psig**
Green Hills Station 2nd Cut	**149 psig**	**50 psig**			**60 psig**
Idrue Station 1st Cut	**262 psig**	**149 psig**			**150 psig**
Idrue Station 2nd Cut	**149 psig**	**46 psig**			**49 psig**

NOTE: All pressures are based on seasonal raises, lowers and consumption during peak load. MAOP's shall not be compromised during raises and shall be assiduously noted.

REGULATOR INSPECTION REPORT FORM							
Gas System	Tompkinsville	Location	Texas Eastern (Gate Station)(Left Run)	Serial	32642		
Make	American	Type	Axial Flow	Size/Body	2"	Orifice Size	40%
Pressure Rating Inlet	265 psig	Pressure Rating Outlet	45 psig				
MAOP To Which The System is Connected	Inlet Pressure MAOP	300 psig	Outlet Pressure MAOP	49 psig			

RELIEF VALVE INSPECTION REPORT FORM							
Gas System	Tompkinsville	Location	Texas Eastern (Gate Station)(Left Run)	Serial	144178		
Make	American	Type	Axial Flow	Size/Body	4"	Orifice Size	Full
Type Loading	Spring Range	10-75 psig	Pilot	✓	Other		
Inlet Pressure	45 psig	Relief Pressure Setting	60 psig				
Connected Pipe Size	4"	Vent Pipe Size		Blow-off Secure	✓ Yes ❑ No		

REGULATOR INSPECTION REPORT FORM							
Gas System	Tompkinsville	Location	Texas Eastern (Gate Sta)(Right Run)	Serial	xxxxxxx		
Make	American	Type	Axial Flow	Size/Body	2"	Orifice Size	50%
Pressure Rating Inlet	265 psig	Pressure Rating Outlet	43 psig				
MAOP To Which The System is Connected	Inlet Pressure MAOP	300 psig	Outlet Pressure MAOP	49 psig			

RELIEF VALVE INSPECTION REPORT FORM							
Gas System	Tompkinsville	Location	Texas Eastern (Gate Sta)(Right Run)	Serial			
Make	American	Type	Axial Flow	Size/Body	4"	Orifice Size	Full
Type Loading	Spring Range	10-75 psig	Pilot	✓	Other		
Inlet Pressure	45 psig	Relief Pressure Setting	60 psig				
Connected Pipe Size	4"	Vent Pipe Size		Blow-off Secure	✓ Yes ❑ No		

REGULATOR INSPECTION REPORT FORM

Gas System	Tompkinsville	Location	Scott's Rock Quarry (Right Run)	Serial			
Make	Mooney	Type	Flowgrid	Size/Body	2"	Orifice Size	50%
Pressure Rating Inlet	265 psig	Pressure Rating Outlet	47 psig				
MAOP To Which The System is Connected	Inlet Pressure MAOP	300 psig	Outlet Pressure MAOP	49 Psig			

RELIEF VALVE INSPECTION REPORT FORM

Gas System	Tompkinsville	Location	Scott's Rock Quarry (Right Run)	Serial	7711		
Make	Mooney	Type	Flowgrid	Size/Body	3"	Orifice Size	100%
Type Loading	Spring Range	10-70 psig	Pilot	✓	Other		
Inlet Pressure	49 psig	Relief Pressure Setting	60 psig				
Connected Pipe Size	3"	Vent Pipe Size	3"	Blow-off Secure	✓ Yes ❑ No		

REGULATOR INSPECTION REPORT FORM

Gas System	Tompkinsville	Location	Scott's Rock Quarry (Left Run)	Serial	6457		
Make	Mooney	Type	Flowgrid	Size/Body	2"	Orifice Size	50%
Pressure Rating Inlet	265 psig	Pressure Rating Outlet	49 psig				
MAOP To Which The System is Connected	Inlet Pressure MAOP	300 psig	Outlet Pressure MAOP	60 psig			

RELIEF VALVE INSPECTION REPORT FORM

Gas System	Tompkinsville	Location	Scott's Rock Quarry (Left Run)	Serial	7711		
Make	Mooney	Type	Flowgrid	Size/Body	3"	Orifice Size	100%
Type Loading	Spring Range	10-70 psig	Pilot	✓	Other		
Inlet Pressure	49 psig	Relief Pressure Setting	60 psig				
Connected Pipe Size	3"	Vent Pipe Size	3"	Blow-off Secure	✓ Yes ❑ No		

REGULATOR INSPECTION REPORT FORM

Gas System	Tompkinsville	Location	Poplar Log Rd. Left (Worker)	Serial	133816		
Make	American	Type	Axial Flow	Size/Body	2"	Orifice Size	Full
Pressure Rating Inlet	255 psig	Pressure Rating Outlet	44 psig				
MAOP To Which The System is Connected	Inlet Pressure MAOP	300 psig	Outlet Pressure MAOP	60 psig			

RELIEF VALVE INSPECTION REPORT FORM

Gas System	Tompkinsville	Location	Poplar Log Rd. Left (Worker)	Serial	N/A		
Make	N/A	Type	N/A	Size/Body	N/A	Orifice Size	N/A
Type Loading	Spring Range	N/A	Pilot	N/A	Other		
Inlet Pressure	N/A	Relief Pressure Setting	N/A				
Connected Pipe Size	N/A	Vent Pipe Size	N/A	Blow-off Secure	❑ Yes ❑ No		

REGULATOR INSPECTION REPORT FORM

Gas System	Tompkinsville	Location	Poplar Log Rd. Left (Monitor)	Serial	133815		
Make	American	Type	Axial Flow	Size/Body	2"	Orifice Size	Full
Pressure Rating Inlet	255 psig	Pressure Rating Outlet	52 psig				
MAOP To Which The System is Connected	Inlet Pressure MAOP	300 psig	Outlet Pressure MAOP	60 psig			

RELIEF VALVE INSPECTION REPORT FORM

Gas System	Tompkinsville	Location	Poplar Log Rd. Left (Worker)	Serial	N/A		
Make	N/A	Type	N/A	Size/Body	N/A	Orifice Size	N/A
Type Loading	Spring Range	N/A	Pilot	N/A	Other		
Inlet Pressure	N/A	Relief Pressure Setting	N/A				
Connected Pipe Size	N/A	Vent Pipe Size	N/A	Blow-off Secure	❑ Yes ❑ No		

REGULATOR INSPECTION REPORT FORM							
Gas System	Tompkinsville	Location	Poplar Log Rd. Right (Worker)	Serial	133813		
Make	American	Type	Axial Flow	Size/Body	2"	Orifice Size	Full
Pressure Rating Inlet	255 psig	Pressure Rating Outlet	44 psig				
MAOP To Which The System is Connected	Inlet Pressure MAOP	300 psig	Outlet Pressure MAOP	60 psig			

RELIEF VALVE INSPECTION REPORT FORM							
Gas System	Tompkinsville	Location	Poplar Log Rd. Right (Worker)	Serial	N/A		
Make	N/A	Type	N/A	Size/Body	N/A	Orifice Size	N/A
Type Loading	Spring Range	N/A	Pilot	N/A	Other		
Inlet Pressure	N/A	Relief Pressure Setting	N/A				
Connected Pipe Size	N/A	Vent Pipe Size	N/A	Blow-off Secure	❑ Yes ❑ No		

REGULATOR INSPECTION REPORT FORM							
Gas System	Tompkinsville	Location	Poplar Log Rd. Right (Monitor)	Serial	133814		
Make	American	Type	Axial Flow	Size/Body	2"	Orifice Size	Full
Pressure Rating Inlet	255 psig	Pressure Rating Outlet	50 psig				
MAOP To Which The System is Connected	Inlet Pressure MAOP	300 psig	Outlet Pressure MAOP	60 psig			

RELIEF VALVE INSPECTION REPORT FORM							
Gas System	Tompkinsville	Location	Poplar Log Rd. Right (Monitor)	Serial	N/A		
Make	N/A	Type	N/A	Size/Body	N/A	Orifice Size	N/A
Type Loading	Spring Range	N/A	Pilot	N/A	Other		
Inlet Pressure	N/A	Relief Pressure Setting	N/A				
Connected Pipe Size	N/A	Vent Pipe Size	N/A	Blow-off Secure	❑ Yes ❑ No		

REGULATOR INSPECTION REPORT FORM

Gas System	Tompkinsville	**Location**	Green Hills Sta (2nd Cut)	**Serial**	16003947		
Make	Fisher	**Type**	EZR	**Size/Body**	1"	**Orifice Size**	60%
Pressure Rating Inlet	149 psig	**Pressure Rating Outlet**	50 psig				
MAOP To Which The System is Connected	**Inlet Pressure MAOP**	300 psig	**Outlet Pressure MAOP**	60 psig			

RELIEF VALVE INSPECTION REPORT FORM

Gas System	Tompkinsville	**Location**	Green Hills Sta (2nd Cut)	**Serial**	16003949		
Make	Fisher	**Type**	1808	**Size/Body**	2"	**Orifice Size**	2"
Type Loading	**Spring Range**	30-75 psig	**Pilot**	✓	**Other**		
Inlet Pressure	50 psig	**Relief Pressure Setting**	55 psig				
Connected Pipe Size	2"	**Vent Pipe Size**	2"	**Blow-off Secure**	✓ Yes ❑ No		

REGULATOR INSPECTION REPORT FORM

Gas System	Tompkinsville	**Location**	Green Hills Sta (1st Cut)	**Serial**	16003945		
Make	Fisher	**Type**	EZR	**Size/Body**	1"	**Orifice Size**	30%
Pressure Rating Inlet	265 psig	**Pressure Rating Outlet**	149 psig				
MAOP To Which The System is Connected	**Inlet Pressure MAOP**	300 psig	**Outlet Pressure MAOP**	150 psig			

RELIEF VALVE INSPECTION REPORT FORM

Gas System	Tompkinsville	**Location**	Green Hills Sta (1st Cut)	**Serial**	N/A		
Make	N/A	**Type**	N/A	**Size/Body**	N/A	**Orifice Size**	N/A
Type Loading	**Spring Range**	N/A	**Pilot**	N/A	**Other**		
Inlet Pressure	N/A	**Relief Pressure Setting**	N/A				
Connected Pipe Size	N/A	**Vent Pipe Size**	N/A	**Blow-off Secure**	❑ Yes ❑ No		

REGULATOR INSPECTION REPORT FORM

Gas System	Tompkinsville	Location	Idrue Sta (2nd Cut)			Serial	16003946
Make	Fisher	Type	EZR	Size/Body	1"	Orifice Size	60%
Pressure Rating Inlet	149 psig			Pressure Rating Outlet	46 psig		
MAOP To Which The System is Connected	Inlet Pressure MAOP	300 psig		Outlet Pressure MAOP	60 psig		

RELIEF VALVE INSPECTION REPORT FORM

Gas System	Tompkinsville	Location	Idrue Sta (2nd Cut)			Serial	16003948
Make	Fisher	Type	1808	Size/Body	2"	Orifice Size	2"
Type Loading	Spring Range	35-125 psig	Pilot	161EB	Other		
Inlet Pressure	46 psig			Relief Pressure Setting	55 psig		
Connected Pipe Size	2"	Vent Pipe Size	2"	Blow-off Secure	✓ Yes ❑ No		

REGULATOR INSPECTION REPORT FORM

Gas System	Tompkinsville	Location	Idrue Sta (1st Cut)			Serial	16003944
Make	Fisher	Type	EZR	Size/Body	1"	Orifice Size	30%
Pressure Rating Inlet	262 psig			Pressure Rating Outlet	149 psig		
MAOP To Which The System is Connected	Inlet Pressure MAOP	300 psig		Outlet Pressure MAOP	150 psig		

RELIEF VALVE INSPECTION REPORT FORM

Gas System	Tompkinsville	Location	Idrue Sta (1st Cut)			Serial	N/A
Make	N/A	Type	N/A	Size/Body	N/A	Orifice Size	N/A
Type Loading	Spring Range	N/A	Pilot	N/A	Other		
Inlet Pressure	N/A			Relief Pressure Setting	N/A		
Connected Pipe Size	N/A	Vent Pipe Size	N/A	Blow-off Secure	❑ Yes ❑ No		

102 Surveillance

Each distribution system supplied by more than one district regulator shall be equipped with recording gauges to monitor the gas pressure in the district.

Tompkinsville Gas System regulator stations are equipped with chart recorders and/or pressure gauges. Recording charts and gauges are observed weekly.

Continuing surveillance shall be conducted so as to identify any pipeline facilities experiencing abnormal or unusual operating and maintenance conditions. This shall be accomplished by the following.

Periodic Visual Inspection of Facilities to Identify Items (PVI)

❶ Changes of population densities.
❷ Effect of exposure or movement of pipeline facilities.
❸ Changes in topography which may have an effect on pipeline facilities.
❹ Potential for or evidence of tampering, vandalism, or damage. See form: #13 (Regulator Security Inspection)
❺ Effects of encroachments on pipeline facilities.
❻ Potential for gas migration through air intakes into buildings from vaults and pits.
❼ Specific circumstances relating to patrolling and leakage. **Reference 192.705, 192.706,192.721, and 192.723.**
❽ Potential for, or evidence of, soil or water accumulation in vaults or pits.
❾ Potential for, or evidence of, excavation activity.

Periodic Review Records

❶ Patrols.
❷ Leakage surveys.
❸ Valve inspections.
❹ Vault inspections.
❺ Pressure regulating, relieving and limiting equipment inspections.
❻ Corrosion control inspection.
❼ Facility failure investigation

NOTE: See (104.1) Investigation of Failures

102.12 Selected pressures at strategic locations (check points) within the distribution system shall be accessible and conveyed to the Gas Systems Operator by recording gauges to monitor the gas pressure in the district.

102.13 Pressures identified in 102.11 and 102.12 shall also be monitored by visual.

The Gas Systems Operator shall immediately respond to any abnormally high or low pressure conditions to bring the affected portion of the distribution system back within the normal operating pressure range. Personnel in Gas as well as available manpower may be enlisted to investigate the cause(s) of abnormal conditions and to initiate such inspections and/or corrections as may be deemed necessary to return the system to normal operating conditions.

All regulator station pressures are monitored daily by qualified personnel. The pressures are monitored at the main gas office. High and low pressure alarms are located at the suppliers office. The alarms are monitored 24 hours a day, 7 days a week, 365 days a year. **See: 141**

102.2 Pressure Recording Devices

Where necessary, permanent pressure recording devices shall be installed to provide continuous surveillance of pressures in the field and shall be checked weekly.

103 Odorization

All natural gas distributed to Tompkinsville customers will be odorized sufficiently to be detectable at concentrations in air of one-fifth the lower explosive limit by a person with a normal sense of smell by a King B-2 By-pass odorizer. The odorant used will not be toxic to breathe or damaging to persons, materials, or pipe. It will not be soluble in water by more than the ratio 2.5 to 100 parts by weight. To insure proper odorant concentration, odorant detection tests shall be performed at each check point monthly using the odorator/odorometer. Odorization equipment at each regulator station shall be visually examined monthly not to exceed 45 continuous days and documented through recordkeeping for proper operation and appearance. For the Tompkinsville Gas System approximately 5/10 to seventy five hundreds of a pound of odorant is needed in order to obtained the correct level for the system. Any abnormal condition found shall be corrected and documented through recordkeeping.

The lower explosive limit for natural gas in a mixture with air is approximately 5%. Therefore the presence of natural gas must be readily detectable at one fifth of that lower explosive limit or 1 % gas in the presence of air.

To meet this standard, there are basic considerations which, when included in the planning and development of a odorization program allows the odorization system to operate at maximum capability and provide a safe natural gas supply. These principal program considerations include;

- Odorant Selection
- System Selection
- Components of the Injection System
- System Performance Audit Trail
- Odorant Level Detection

Odorant Selection & Use

The selection of the odorant to be injected is an important aspect of total system implementation. Selecting the specific odorant to be injected involves knowledge of the chemical composition of the gas, the physical and chemical characteristics of available odorants, the physical layout of the pipeline system and local storage tank, ambient conditions, the desired odorant level, and the current recognition of smell that the local population has.

Sometimes changing odorant may create problems in that the smell may be slightly different than what the population is used to. Always consult the chemical manufacturer when selection or changing the chemical odorant is contemplated.

Odorants which are commonly used are typically a blend made of the following components;

- Tertiary Butyl Mercaptan or (TBM)
- Isopropyl Mercaptan or (IPM)
- Normal Propyl Mercaptan or (NPM)
- Secondary Butyl Mercaptan or (SBM)
- Dimethyl Sulfide (OMS)
- Methyl Ethyl Sulfide (MES)
- Tetrahydrothiophene (THT)

Note that THT is sometimes used by itself as an odorant.

Each of these components have characteristics which when used as a component of an odorant blend in a specific percentage make it suitable for specific applications.

For example a typical odorant blend that is comprised of 75-80% TBM and 20-25% OMS is very suitable for an injection type system because of the characteristics of the components. The characteristics to consider when selecting an odorant or odorant blend include;

- Vapor pressure
- Gassy odor
- Soil penetrability
- Resistance to oxidation

Each manufacturer of chemical odorant has rigid specifications for the chemicals they produce. Consultation with the manufacturer is highly recommended in order to attain the correct chemical for each application.

Critically important to the odorant system is the local delivery of odorant. This is another area that the chemical manufacturers take great care in addressing. It is important that no odorant be released as well as limiting fugitive odor emissions during the fill process. The odorant manufacturer typically has systems onboard the chemical truck to allow for safe delivery of the chemical. For smaller injection applications, odorant can be delivered in transportable containers from which the odorant can be transferred or in some cases the chemical can be injected directly from these containers.

System Selection

As in any application of equipment, it is essential to select the proper tool for the job. In the odorization process this is an essential step. Generally, odorant systems introduce odorant into the gas stream in two ways.

Chemical absorption
Chemical injection

Absorption type systems rely on the diffusion of odorant into a flowing natural gas stream by taking advantage of the chemical characteristics of the odorant vaporizing into the natural gas.

Tompkinsville employs the bypass system, which involves a storage tank containing odorant which is connected to the pipeline such that a portion of the flow of the pipeline bypasses through the odorant storage tank and contacts the surface area of the natural gas within the tank. The chemical characteristics of the odorant allow for vaporization of the odorant into the flowing natural gas and the odorized gas flows back through the bypass line back into the main flow stream and mixes with the primary pipeline. These systems are typically applied in low but steady flow volumes.

In applying absorption systems, care should be taken to insure that no contaminants (liquids) enter the system which may inhibit the effect of the odorant on the gas stream, and that the ambient temperature of the odorant remains relatively constant.

Odorant Level Detection

The final component in the odorization process is the testing for odorant intensity throughout the system. Recalling the set standard mentioned previously, the goal is to be able to readily detect the presence of natural gas at one-fifth the explosive limit with a normal sense of smell, it is necessary to physically sample the gas, and using someone with a normal sense of smell, evaluate the sample for detectability. Tompkinsville currently employs qualified individuals able to verify the presence of odorant during the application of odorant sampling.

This process enables those in proximity to gas facilities or those using natural gas to be able to detect leaks and take action to avoid accidents.

The process for conducting test may be a function of state mandates and it is usually required of users to conduct periodic testing of combustible gases to determine the concentration of odorant.

Compliance with these mandates in determining who, what, when, and where testing should be done is up to each company. The user must know what instruments are available for testing and basic guidelines in their application to implement a successful testing process.

Test Instruments

Tompkinsville quantitative olfactory test, commonly called the "sniff" test is performed using the Odorometer.

The unit is designed to mix gas and air and move them to a sniffing chamber. The air is drawn in through the unit and mixes with gas. The technician smells the gas and air mixture, gradually raising the level of gas in the mixture until he or she detects an odor of gas.

The Odorometer is designed to test for odor intensity. To take a test with this device you must first zero the unit following the instructions printed on the side of the box. Next open the gas valve while positioning your nose above the sniff chamber until the odor intensity reaches the threshold level. Push the display button and copy down the reading. Again with your nose above the sniff chamber, open the valve until the odor intensity reaches a readily detectable level. After the readily detectable level is reached, you push the display button and read the display. Then compare the two display readings to the chart for correction on the side of the unit to get your test results.

Information regarding location would include:
- Location name
- City
- State
- Zip Code
- Operator

Regardless of the type of device being used, considerations to assure an accurate sniff test include:

- All units shall be calibrated according to the manufacturer's recommendations.
- The operators shall be trained and refreshed annually on the operation of the instrument they are using and how to properly take a test.
- Units, hoses, regulators and other accessories shall be checked and smelled before taking test.
- Smelly hoses shall be replaced.
- Other accessories that smell should be replaced or cleaned to remove smell. Verify units are in good working order.
- Do not over pressure units (see manufactures specs on the unit).
- Do not smoke, eat, or drink 30 minutes prior to taking a test. (Masking effect.)
- Do not take tests after plunged exposure to odorant (for example after removing a regulator that smells, after filling odorant tanks, etc.).

Test Locations and Frequency of Tests

Taking a test out in the open such as at town border stations and regulator stations is not recommended. Reference ASTM 6273, Standard Test Methods for Natural Gas Odor Intensity. **Recommended places to test are facilities that are manned 24 hours a day so usage is enough to have fresh gas, thus giving a better picture of the system at that time. City and government buildings such as:**

- Fire Stations
- Police Departments
- Post Offices
- Schools
- Gas Company Service Buildings
- Military Bases

Good test points would include water heaters and stoves. Permanent test points can be installed to simplify testing. Sample the beginning middle and ends of your system to achieve balance in odor testing.

ODOROMETER TEST POINTS "Sniff Test"			
Emberton/Sulphur Lick Rd.	Hayes/403 Martin Subdivision	Lyons/H. Lyons Rd.	Finley/Clark Estates
S. Central Bank/Edmonton Rd.	Lyons Chapel Ch/Hwy 100	Farmer's Service/Magnolia St.	Adams/Clark Estates

104 Investigation of Failures

104.1 Piping System Failures

In order to minimize the possibility of recurring piping failures which result in gas leakage, the operator shall establish and implement procedures for reporting, recording, and investigating such failures.

104.2 Associated Equipment Failures

The supervisor responsible for the area in which equipment failure occurs shall conduct an investigation of each such failure.

104.3 Reportable Failures

Any failure of the gas system or associated equipment causing death, injury requiring hospitalization, property damage of $50,000 or more or for which the Emergency Procedures stated in Section 120 are invoked, shall be investigated.

105 Corrosion Control

105.1 Preliminary Protection of Piping

Buried steel gas piping must have an external protective coating meeting the requirements of the utility's coating specifications. Within one year of completion of construction of such piping, a cathodic protection system designed to adequately protect the installed piping from external corrosion shall be installed and placed in operation. All installations of anodes shall be attached by means of Thermite attachment (Cadweld.) The installation shall include the following:

* **Clean the pipe thoroughly.(Bare metal)**
* **The anode lead wire is stripped back approximately 3".**
* **The thermite mold shall be thoroughly cleaned of all debris and moister.**
* **The Cadweld shall be applied to the mold, ❶ tin blind placed in throat of mold, ❷ iron powder fill the mold, ❸ ignition powder applied to iron powder, ❹ mold placed on top of the pipe, ❺ lead wire inserted into placement tunnel, ❻ mold lid shut to protect personnel, ❼ a spark lighter shall be used to ignite the ignition powder, ❽ the powder breaks down into a molten fusion material and shall fuse with the pipe and copper wire.**

The Tompkinsville Gas System is protected by anode ground bed.

Where piping is initially protected, field tests and surveys shall be conducted to verify adequate protection of that piping. Records of tests, surveys, and other important information shall be forwarded to, and maintained by, the Gas Operator. This information must include, the following:

105.11 Assurance that complete electrical isolation of the protected piping from foreign structures, including casings, has been accomplished. Pipe casing isolation shall be verified by potential tests, pipe locator.

105.12 Electrical continuity must have been achieved for each segment of piping protected as a unit. Continuity shall be verified by pipe-to-soil potential surveys. Where continuity cannot be verified by potential surveys, the pipe locator shall be used as verification equipment.

105.13 A pipe-to-soil potential survey of the piping, including all applicable components, laterals and extremities, shall be conducted and must indicate a cathodic potential of at least -.85 volts to the copper-copper sulfate reference half cell. Various points must be surveyed to assure adequate coverage of the piping.

105.14 The cathodic protection system shall be designed and installed to minimize any adverse effects on existing, adjacent, underground structures.

When foreign interference which may affect protected piping or structures is found to exist, corrective measures must be taken to minimize and monitor the effects of such interference.

105.15 The determination to electrically connect segments of protected piping to an existing protected system shall be made by a Corrosion Control Technician.

105.16 Piping sharing a common trench with electrical conductors (joint trench) shall be electrically isolated from non-joint trench piping and protected as a separate entity.

105.2 Monitoring

All tests and surveys conducted after July 31, 1971 are outlined in 105.1, "Initial Protection of Piping", indicate an adequate level of protection has been achieved, scheduled surveillance of the piping shall be initiated. This must include inspections of cathodic protection facilities and pipe-to-soil potential surveys conducted at various locations designated as routine check or monitoring points. A sufficient number of such points shall be selected to provide reasonable coverage of the protected area and must be so located that periodic potential tests will reflect the level of protection received by the piping in that area. The Gas Operator shall review each area periodically and where necessary, adjust the monitoring system to reflect changes in the area's piping system. To ensure an effective and continuous level of protection, the following monitoring schedule shall be adhered to:

105.22 Galvanic Anode Areas

Annually - Potential survey at all monitoring points within each area once each calendar year with intervals not to exceed fifteen (15) months.

105.24 Isolated Components, Services

Annually - Potential survey of not less than ten percent of isolated components and ten percent isolated services distributed over the entire system. Surveys must be scheduled in such a manner that a different ten percent will be tested each calendar year so that all such components and services will be tested at least once in each ten year period.

105.25 Casings

Annually - Potential survey of metallic casings and the steel piping passing through the casing. Records of tests will be forwarded to the Gas Operator. If the two readings at a location are similar, additional inspections and tests may be made to determine whether the line pipe is electrically isolated from, or shorted to, the casing. When the readings or tests show the casing to be shorted to the line pipe, one of the following courses of action must be followed and performed by either the Gas Operator representative or a Corrosion Control Technician:

a. Clear the short.

b. Fill cavity between casing and carrier pipe with high dielectric casing filler.

c. Monitor the casing with leak detection instruments at intervals not exceeding 4-1/2 months. If a leak is detected, it should be reported and immediate corrective action must be taken.

105.251 Rectifier Identification

Rectifiers:

Tompkinsville #63 and 839

Fire Hall

Tompkinsville Cathodic Protection Test Locations	
Odorizer Station	108 5th Street Media Riser
Sand Lake Church Meter Riser	611 Columbia Ave. Meter Riser
HRP – Old Inn	415 Crawford St. Media Riser
Steve Curtis Residence	United Methodist Church Meter Riser
Town of Border Station	Elementary School Meter Riser
Lyon Lumber Company Meter Riser	Key Manufacturing Company Meter Riser
612 Emberton Meter Riser	Entrance Trailer Park Meter Riser
406 Emberton Meter Riser	208 S. Main St. Meter Riser
501 4th Blvd. Meter Riser	305 Jackson Meter Riser
405 5th St. Meter Riser	Wash House Laundry Meter Riser
506 Jackson St. Meter Riser	Casing to Soil Potentials Hwy 63 at Popular Rd Vent Pipe
802 Columbia Ave. Meter Riser	Magnolia
301 Pedigo St. Meter Riser	Falcon Nest
Nursing Home Meter Riser	Lyon's Lumber
Housing Project Meter Riser	Wood Haven
Time Saver Laundry Anode	

105.26 Test Station Color Codes

TEST STATION WIRE COLOR CODE

Indicates #12 Wire is attached to the 175 psig system

Indicates #12 Wire is attached to the 90 psig system

Indicates #12 Wire is attached to the intermediate system

Indicates #12 Wire is attached to the Ounce/Inches system

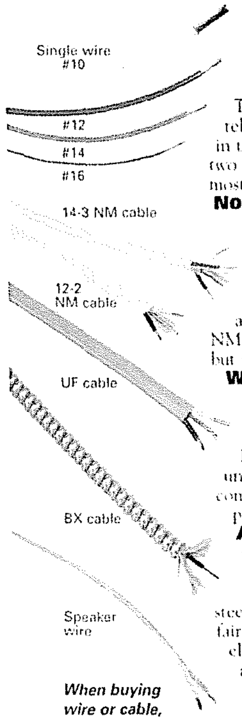
Indicates #12 Wire is attached to a 17lb. Magnesium Anode only

Indicates #12 Wire is attached to Casing Pipe only

NOTE Test Stations attached to regulator station piping will not go by these rules.

CABLE AND WIRE

Choose the wire and cable that are correct for the job. The wrong cable or wire size could create a fire hazard and would have to be replaced in order to pass inspection. Here are your options.



When buying wire or cable, you need to consider the type (single insulated, sheathed, or armored), wire size, and number of wires in the cable. Above are common cables used in home remodeling.

SELECTING CABLE

A cable is two or more insulated wires wrapped in sheathing. Most cables carry two or three wires, plus a ground wire. The numbers printed on the sheathing tell you how many wires of which size are in the cable. For instance, "14-2" indicates two No. 14 wires (*plus a ground wire in most cases*).

NONMETALLIC: Nonmetallic (NM) sheathed cable is the most commonly used cable for residential wiring. It contains two or three insulated wires, plus a bare copper wire, all in a paper wrapping and encased with moisture- and flame-resistant plastic sheathings. NM cable is easy to use and inexpensive; but its sheathing is easily damaged.

WATERPROOF: Type UF (underground feeder) nonmetallic cable has the wires encapsulated in solid PVC sheathing. Use it wherever wiring might get wet. In some localities you can bury UF cable underground by *itself*, while other communities require that it be run through plastic conduit.

ARMORED: Armored, or BX, cable has insulated wires running in a flexible metal jacket. The newer, aluminum-clad BX is lighter and easier to use than the older steel-clad type. Because the armor provides a fair amount of protection to the wires, local electrical codes often permit it in areas that are semiexposed, such as basements or inside cabinets. BX may contain a green-insulated ground wire. In many systems, however, the sheathing itself acts as the ground (*see page 13*).

CONDUIT: Commercial and some residential wiring often use conduit instead of cable. Conduit, often called "thin-wall," is metal or plastic pipe through which wires are run. It is more expensive, but very safe.

WIRE

Wire in cable that runs in walls is made of a solid strand of metal; wire in appliance and extension cords is made of many thin strands wound together. Cord wire can be bent many times without breaking.

INSULATION: Wires made prior to the mid-1960s may have rubber or cloth insulation, both of which become brittle and crack over time. Newer wires are coated with vinyl, which is more durable and lasts longer.

TYPE OF METAL: Most wire is made of copper. But for a few years in the late 1960s, some wire was made of aluminum. If your cable is stamped with "AL" and your wires are silver-colored, you have aluminum wire. Take care: Dissimilar metals in contact with one another cause corrosion. *If an aluminum* wire is connected to a brass or copper screw, it could come loose after a few years. Use only receptacles and switches specifically designed for use with aluminum wire.

COLOR CODING: Some nonprofessionals don't pay attention to wire insulation color—and that's dangerous. Wire colors give you specific information about each wire's purpose. A white wire is neutral, carrying power back to the service panel. A black wire is hot, carrying power out to the receptacle or appliance. A bare or green-insulated wire is used as a ground wire. A red wire is hot. Red, blue, and other colors indicate hot wires. Sometimes electricians alter the color scheme for different circuits. *A white wire that has* been painted black or wrapped with black tape indicates that it is being used as a hot wire (*see examples on pages 80–82*).

WIRE SIZE: The thicker the wire, the more current (amperage) it can carry without overheating.

The same applies to cords. Light-duty household extension cords generally are thick enough to handle a total of only 1,600 watts, or about 13⅓ amps. For heavy-duty appliances, buy a heavier gauge extension cord. Some appliances have limits on the length of even heavy duty extension cords.

Use the chart below to determine which wire to use with which circuit.

THE RIGHT WIRE FOR THE AMPERAGE

Wire Size	Amps
No. 14	15
No. 12	20
No. 10	30
No. 8	40

105.3 Maintenance
When potential surveys, tests or inspections, or scheduled indicate an unacceptable level of protection, prompt action shall be initiated and continued until an acceptable level of protection is obtained.

105.31 The Corrosion Control Technician shall determine the nature and location of faults on the piping or its associated cathodic protection facilities.

105.32 When the source of trouble has been located and the necessary corrective measures identified, the Corrosion Control Technician shall submit a work request for repairs. The request will specify date, nature of trouble, and work required.

105.4 Corrosion Control Records
All records relating to the operation, maintenance and effectiveness of the cathodic protection system shall be retained for the life of the facilities. Records considered necessary to provide this history shall be defined and maintained by the Gas Operator. Records must include data pertaining to all locations, tests, surveys and inspections set forth in these procedures and include the following:

105.41 Locations of corrosion control facilities: (ground beds, cables, sacrificial anodes, insulations, test leads and bonding conductors.)

105.42 Soil resistivity tests

105.43 Interference surveys

105.44 Pipe-to-soil potential surveys

105.45 Voltage and current outputs of rectifier units

105.46 Faults on protected structures

105.47 Maintenance of cathodic protection equipment

105.48 Completed maintenance records showing repairs on corrosion leaks

105.49 Records detailing pipe inspections with displayed external corrosion

105.5 Location of Piping in Relation to Electric Transmission **Lines** (Transmission Tower Current Bleeds)
Procedures for the initial protection of piping outlined in 105.1 shall also apply to piping located in the area of electric transmission lines. Monitoring of such piping shall be conducted annually as in 105.22. Routine surveys or trouble shooting of piping considered to be subject to induced voltages due to unbalanced line or fault currents shall be conducted only under suitable weather conditions. During surveys or maintenance, only one anode or anode bed shall be disconnected from the pipe at a time so as to maintain grounding for induced voltages. When it becomes necessary that the pipe be cut, a bonding conductor shall be attached to the pipe across the point of separation to maintain electrical continuity. See: **EMF on pipelines. (Nikola Tesla 1894)(Cresson Award.)**

105.51 Piping and insulating flanges located in the area of electric transmission lines (electric lines) shall be protected from damage by fault currents or lightning. Protective measures include anodes, grounding cells, zinc ribbon and insulation kits (unions, sleeves and gaskets).

105.6 Visual Inspection of Exposed Metallic Piping
Buried piping which has been intentionally uncovered or otherwise known to be exposed shall be examined by the excavating crew for evidence of external corrosion and/or coating defects. If external corrosion requiring remedial action under 49 CFR 192.483 through 192.489 is found, the operator shall investigate the immediate surface and length beyond the exposed portion (by visual examination) to determine whether additional corrosion requiring action exists in the vicinity of the exposed portion. All actions shall be recorded.

105.61 Monitoring Atmospheric Corrosion
Above ground natural gas piping exposed to the atmosphere and installed after July 31, 1971 shall be visually inspected at intervals not exceeding 36 months not to exceed 39 months. If atmospheric corrosion exist on above

ground metallic piping then remedial action shall be taken to protect the integrity of the material. Surveys may utilize leak survey crews and meter readers to identify localized or general corrosion on above ground piping. Close inspection should be made where clamps, rest plates, sleeved openings, under thermal insulation, under disbonded coatings, at pipe supports, in splash zones, at deck penetrations, and in spans over water and air to soil bacterial areas exist (192.481.) Corrosion surfaces shall be properly cleaned and stripped of all active corrosion and properly prepared for coated using approved coating and protective materials. **NOTE:** Reference guide for proper protective coating can be found in "Good Painting Practices (Volume 1 and 2) which is published by the Steel Structures Painting Council."

105.7 Visual Inspection of Installed Steel Piping

The coating on steel piping that is to be installed in a ditch, shall be inspected by the construction crew prior to lowering and backfilling to insure that no damage has occurred that would be destructive to corrosion control. If damage is found, the coating shall be repaired by approved methods.

105.8 Electrical Inspection of Installed Steel Piping

In addition to a visual coating inspection as outlined in 105.7, all new steel piping that is to be operated in buried service at a hoop stress of 20% or more of its specified minimum yield strength (SMYS) must be electrically inspected or "jeeped" by the installing agency. This inspection should be performed as installation progresses and prior to lowering and backfilling. If coating damage is detected that would be destructive to corrosion control, the coating shall be repaired by approved methods.

105.9 Internal Corrosion Control

Whenever any pipe is removed from a pipeline for any reason, the internal surface must be inspected for evidence of corrosion. If internal corrosion is found, then adjacent pipe must be investigated to determine the extent of the internal corrosion. Natural gas containing more than 0.25 grain of hydrogen sulfide per 100 standard cubic feet (4 parts -per-million) may not be stored in pipe type or bottle type holders. Provisions shall be made to monitor internal corrosion if the natural gas stream contains more than 0.25 grain of hydrogen sulfide per 100 standard cubic feet (4 parts -per-million). The means of Internal Corrosion Detection are as follows:

- Visual inspection of pipe upon removal from service
- Corrosion Protection Probes
  - ❶ Weight loss coupons
  - ❷ Resistance probes
  - ❸ Polarization probes
  - ❹ Hydrogen probes
- Sampling and chemical analysis
- Internal inspection tools
- Ultrasonic inspection
- Radiography (x-ray)

NOTE: The following references may used as guide material to establish procedures for physical inspection of internal corrosion. ① NACE Standard RP0175-75 "Control of Internal Corrosion in Steel Pipelines and Piping Systems." ② NACE Standard MR0175-94 "Sulfide Stress Cracking Resistant Metallic Materials for Oilfield Equipment." ③ NACE Technical Report 3D170 "Electrical and Electrochemical Methods for Determining Corrosion Rates."

106 Record-Keeping Procedures

The following records shall be maintained on all new underground piping system installations and repairs and/or changes to existing underground piping systems in detail to provide historical information, physical location, design ratings, and any other data necessary for the safe and continuous operation and maintenance by the Gas Operator.

106.1 Gas Distribution Main Lines

The Gas Operator shall review and update system maps on a regular basis. Completion reports for new installations, repairs or replacements shall be stored as a permanent record for the life of each gas main. All records shall be made available.

106.2 Patrols and Leak Surveys

The Gas Operator shall maintain records of the distribution pipeline patrols and leakage surveys.

106.3 Underground Valves

106.31 Gas distribution valves shall be plotted on gas system maps. Individual map reference records shall be maintained indicating size, type, and location of each valve.

The inspection and maintenance record of each control valve and each inlet control valve at regulator stations will be maintained by the Gas Operator. The inspection and maintenance records of all other control valves will be maintained as well by the Gas Operator. Records shall be maintained for the life of the valve. (See 114.3, "Gas Distribution Valves")

106.32 Service valves shall be shown on individual service tickets with size, type, and location.

106.4 Services
Completion reports (service tickets) showing size, type, tap location, valve location, corrosion control facilities and pressure tests of each service shall be recorded as a permanent record and maintained in the Gas Operators Records.

106.5 Meters
The Gas Operator shall maintain records on each gas meter for the life of the meter. The gas meter replacement program shall comply with the KPSC (Rule 51.) The replacement may be referred too as the "Change for Age Program." Meters shall be change for age based on a 20 year period. Records shall show:

1. **Locations**
2. **Date of installation and removal**
3. **Ticket when installed and removed**
4. **Maintenance performed on the gas meter**

NOTE: Each meter and service regulator, whether inside or outside of a building, must be installed in a readily accessible location and be protected from corrosion and other damage.

106.6 Regulators and Relief Valves
The Gas Operator shall keep updated drawings of all gate stations, district regulators, and large industrial regulator installations. The Gas Operator shall maintain a data card showing make, type, serial number, inner valve size, set pressures, relief settings and a record of all inspections and maintenance.

106.7 Odorization
Records shall be kept of the average daily odorant usage, and of all odorometer or other tests used to determine effectiveness of odorization. Records are to be kept on file for at least one (1) year.

106.8 Leaks

106.81 The Gas Operator shall keep a record of all reported leaks and the disposition of each leak reported in accordance with the procedure set forth by the Department of Transportation.

106.82 The Gas Operator shall maintain a record of all leaks found by a frequently scheduled leak survey.

106.9 Other
The Gas Operator and or contractors that are Operator Qualified task oriented for specific operations shall maintain records of their own area of responsibility that are necessary for the safe & efficient operation of Tompkinsville Gas.

107 System Pressure Changes
Except as outlined in Section 114, "Valve Maintenance", and Section 120, "Emergency Procedures", there shall be no system pressure changes without clearance orders from the Gas Operator. This will include, but is not limited to, valve operations, cutting of mains, squeezing off of mains and resetting regulator outlet pressures.
In order to minimize service interruptions, the Gas Operator shall use maps in determining the sequence in which valves are to be checked and operated.

107.1 Valve Operations
Valves located in any main of the Gas Distribution system shall not be opened or closed without a clearance order from the Gas Systems Operator. (See 114.4, "Valve Operations Procedure" and 117.7 "Obtaining Clearance Orders")

107.2 District Regulators
No pressure changes shall be made on district regulators without a clearance order from the Gas Operator. The pressure setting of district regulators shall be determined by the Gas Operator according to the needs of the district and related to standards set forth in Section 101, "Pressure Limitations". These changes may be seasonal related.

107.3 Gate Stations
There shall be no pressure changes at any gate station without a clearance order from the Gas Systems Operator.

108 Leak Reporting

108.1 General
Procedures for advising customers and the general public in recognizing gas leaks and emergency conditions, and the reporting of such conditions to appropriate officials shall be developed and maintained. CFR 49, 192.616
Dispatching facilities for receiving reports of gas leaks or emergency conditions shall be maintained twenty four (24) hours a day, seven (7) days a week. See: 141

108.11 Employees involved with responding to gas leaks and emergency conditions shall be trained and qualified in the appropriate procedures. Investigation for leakage shall be exercised to eliminate all possible leakage.

108.12 Appropriate fire, police, and other public officials shall be kept informed as needed of current leak reporting and emergency procedures.

108.2 Responding to Gas Leak Reports

108.21 The employee receiving a report of a gas leak will ask the person reporting the leak the necessary questions to properly complete the leak report form. It is important that as much information as possible be obtained in order that the person receiving the call can properly evaluate the urgency of the call. The employee receiving a leak report shall determine whether or not gas is present inside a structure and if the leak should be classified as a non-urgent or urgent leak. **The employee shall then advise the person reporting the leak to follow the emergency instructions listed below.**

1. **Do not operate any electrical switches.**
2. **Extinguish any open flame, do not smoke or use matches.**
3. **Lay down the phone, DO NOT hang up the phone, DO NOT use the phone again.**
4. **Leave the premises, but be available for our service person when he or she arrives.**
5. **Never stand close to the structure after evacuation of the premises. Located at a safe distance.**

108.22 Necessary personnel shall be dispatched to the location to perform an evaluation. Samples of air in the enclosures of the structure(s) are to be taken and evaluated. If a strong odor of gas is detected, or if the combustible gas indicator (CGI) or electronic gas indicator produces a reading of any magnitude on any scale in an unconfined area of open atmosphere of any enclosure, the responding personnel shall then take any actions deemed necessary in addition to the following:

1. **Evacuate all occupants of the structure immediately.**
2. **Advise and ensure that no electrical switches are operated and occupants move away from the area.**
3. **One door may remain open. The door all occupants exit by shall be the only door left open. This action shall ventilate the structure at a slower rate, allowing occupants to locate to a safe discuss from the structure.**
4. **Shut off gas supply to the structure.**
5. **Probe the ground, meter boxes and available openings outside the structure, and test each with the combustible gas indicator or the electronic gas indicator for the presence of gas.**
6. **After determining that there is no gas in the ground and properly airing the structure, restore gas supply and check all piping and appliances downstream of the meter for leaks by appropriate means such as a tighness test (pressure test) or by timing of the gas meter.**
7. **Repair leak or notify the customer to have the situation repaired. If repairs by the customer are required, turn off and lock the meter (Make Safe).**
8. **If gas is detected in the ground, check surrounding structures for gas, locate and repair all leaks, check repairs, and restore service. A complete investigation of the cause of system failure shall be conducted, and a report shall be filed in accordance with 106.81.**

9. **When conditions are absolutely safe, occupants may be returned to the structure.**

NOTE: Periodic checks shall be made as the level of gas-in-air changes during ventilation to ensure a safe environment for emergency personnel. All suspected leakage sites shall exhaust possibilities of multiple leaks. See: Emergency Procedure manual.

108.3 Governmental and Gas Operator Reporting
Requirements for leak reporting are stated in Appendix I, "Department of Transportation (DOT) Reporting Requirements" and Appendix II, "Kentucky Public Service Commission" Reporting Requirements".

108.31 Telephonic Reports
Leaks requiring notice by telephone to DOT and KPSC will normally be made by the Manager of the Local Distribution Company (LDC). If the manager is unavailable the next responsible person(s) shall initiate a telephonic report.

108.32 Written Reports
The responsible personnel repairing the leak shall prepare the required written reports and forward them to the Gas Operator for processing.

108.33 Informational Gathering
Gathering the required information to be facilitated shall fall to each department head, upon which each shall establish and implement detailed procedures for obtaining and transmitting required data to the appropriate areas.

109 Recognition and Reporting of Safety Related Hazardous Conditions

Personnel engaged in the operation and/or maintenance of the gas facilities shall report conditions which constitute, or if allowed to continue will constitute, a potential hazard to life or property. Except as provided in paragraph 109.7 of this part, a condition which meets the following guidelines shall be classified as a "Safety-Related Condition" and reported as outlined in Appendix I, Part 191.25 of the CFR 49.

109.1 Corrosion
Each segment of a distribution pipeline (other than cast iron or ductile iron pipe) that operates at a hoop stress of 20% or more of its specified minimum yield strength (SMYS) that has reduced the pipe wall thickness to less than that required for the maximum allowable operating pressure or pitting that leakage might result in must be replaced or repaired. (192.487.) See: 101 Limitations, 111 Mainline Maintenance and 112 Repair Procedures.

109.2 Environmental Conditions
Movement, shifting, heaving or loading caused by acts of nature such as earthquakes, flooding, freezing or landslides that impair the effectiveness of a pipeline.

109.3 Material Defects and Damage
Any material defect or damage that affects of a pipeline that operates at a hoop stress of 20% or more of its SMYS.

109.4 Operational Malfunctions, Errors
Any malfunction or operating error that causes the pressure of a pipeline to rise above its MAOP.

109.5 Leaks
A leak in a pipeline that creates an emergency.

109.6 Pressure Reduction, Shutdown
Any safety related condition that could lead to a potential hazard which causes, directly or indirectly, a 20% or more reduction in operating pressure or an emergency shutdown of a pipeline.

109.7 Conditions Not Reportable

a. **Conditions that exist on a master meter system or a customer-owned service line (fuel line).**
b. **A safety related condition which is an incident or results in an incident (as determined in Appendix I or Appendix II) before the deadline for filing the Safety Related Condition Report.**
c. **A safety related condition which exists on a pipeline that is located more than 220 yards (Class**

location) from any building intended for human occupancy or outdoor place of assembly and which does not lie within an active railroad, street, highway, or paved road right-of-way.

d. Any safety-related condition that is corrected by repair or replacement before the deadline for filing the Safety Related Condition Report.

e. A report is not required under 109.1, "Corrosion", in cases where corrosion pitting is localized on an effectively coated (holiday) and cathodically protected pipeline and the affected portion is repaired or replaced before the reporting deadline.

109.8 Deadline for Filing Safety Related Condition Reports

Safety related conditions should be reported on the outline shown in Appendix III of this manual. This report must be filed within five (5) working days after an authorized representative of Tompkinsville Gas System determines that the condition is actually safety related. The report must be filed within ten (10) working days after the condition is first discovered. See Section 191.25 of Appendix I of this manual for the specific language concerning the deadline for filing a written report.

110 MAINTENANCE PROCEDURES

111 Main Line Maintenance

111.1 Patrolling

If required, all gas lines operating at a hoop stress of 20% and above of the specified minimum yield strength shall be patrolled not less than 4-1/2 months not to exceed 7-1/2 months. Patrolling right-of-ways shall be maintained on all pipelines at a 15 feet minimum.

111.2 Corrosion

Corrosion inspection, classification, testing, and maintenance shall be performed in accordance with Section 105, "Corrosion Control".

111.3 Leak Records

Information concerning leaks shall be reported by the personnel responsible for the repairs as soon as practical after the repair has been completed. The information shall consist of a statement outlining the work performed, a sketch showing locations of all repairs made and the type of repair, cause of leak, the date of the repairs, and the signature of the personnel in charge of the repair. This information shall be made a part of the permanent record of the pipeline and maintained for the life of the pipeline.

111.4 Pipeline Markers

111.41 Underground pipelines crossing traffic shall be identified by a marker. The top of the marker shall be at least three (3) feet above the normal ground line. Each pipeline system shall have markers identified by color code so that the markers from the origin to the end of the line will be identified with the same color. Line markers must be placed and maintained along each section of a distribution main that is located aboveground in an area accessible to the public. See: **Tompkinsville pictures. (Signs identifying emergency call numbers.)**

111.5 Repair Procedures

Temporary or permanent repairs shall be made on all lines which have a leak, corrosion pitting or other imperfection, or that has received damage which in the judgement of the representative of the Gas Operator would endanger the public. When temporary repairs are deemed appropriate, permanent repairs shall follow as soon as possible.

111.51 Any imperfection in the line should be repaired by cutting out a cylindrical piece of pipe. If this is not feasible, a full encirclement welded split sleeve shall be used to cover the imperfection. The pressure maybe be reduced to less than 20% of SMYS during the welding operation.

111.52 Repairs to steel pipes which contain dents, gouges, grooves, arc burns or similar imperfections which have not resulted in a leak shall be made in accordance with 49 CFR 192.309, "Repair of Steel Pipe". If any of the imperfections result in a disturbance of the curvature of the pipe greater than 2% of the pipe diameter, it shall be removed by cutting out the damaged portion as a cylinder.

111.53 Repairs to welds shall be made in accordance with 49 CFR 192.245, "Repair or Removal of Defects."

When a weld is leaking, it shall be cut out and replaced. If it is to be repaired by grinding or by welding on an encirclement saddle, the pressure may be reduced to less than 20% SMYS during the repair. **NOTE:** Welds must be performed by a qualified welder as described in CFR 49, Subpart E, 192.225, 227(b), 229(a)(b)(1)(ii) Welding of Steel in Pipeline.

112 Distribution Piping Maintenance

112.1 Patrolling

The frequency of patrolling shall be determined by the severity of the condition which could cause failure or leakage and the consequent hazards to public safety. The Gas Operator shall keep records of all mains exposed to the atmosphere, (except for gate and district regulators which are covered in this manual) and mains located in places or on structures where potential physical movement or external loading could cause failure or leakage. Mains exposed to the atmosphere will be monitored at intervals not exceeding three (3) years. Mains subject to anticipated movement or external loading which may result in failure or leakage, will be patrolled at a minimum of 4 times a year. (see the bridge inspection form, ("Inspection of Gas Mains on Bridges"). These records will include:

(1) Location
(2) Location of pipe
(3) Length of bridge or span
(4) Length of pipe exposed
(5) Pipe size
(6) Type of hangers
(7) Distance between hangers
(8) Condition of hangers
(9) Pipe properly supported
(10) Paint condition
(11) Coating condition
(12) Condition of expansion joints (if any)
(13) Condition of pipe at bridge piers/abutments
(14) Signs of electrical shorts or friction
(15) Need of protective post at bridge ends
(16) Detection of gas leakage
(17) Any sign of bridge movement which could cause unanticipated movement or external loading(18) Follow up recommendations
(19) Priority (when work will be completed)
(20) Inspectors signatures

NOTE: Unforeseen movement/external loading shall be defined as: vibrations, vehicular impact, earth movement, future excavations, washouts, floods, unstable soil, landslides, areas where piping support may have been weakened by outside third party construction of other utilities and where hazards that may cause the pipe to move or to be subjected to abnormal loads.

112.2 Leak Surveys

112.21 Any leak or odor call from the general public, police, fire, or other authorities, or notification of damage to facilities by contractors or other outside sources shall be investigated by a representative of the Gas Operator to determine if corrective action is required.

112.22 Leak Classification

Grade "1" - This classification shall designate a leakage condition which, due to its location and/or relative hazard potential, shall require immediate corrective action until the hazardous condition no longer exists.
The leak shall then be scheduled for immediate repair activity. Grade "1" leaks include, but are not limited to:

1. **Any indication of gas entering buildings or tunnels.**
2. **Any reading from a combustible gas indicator within five (5) feet of the foundation wall of a building which, in the judgment of the representative of the Gas Operator, is potentially dangerous.**
3. **Any reading of at least 4% gas-in-air or greater from a combustible gas indicator on a sidewalk in a paved area.**

4. **Blowing gas.**
5. **A leak from a transmission line within Class 3 and 4 locations as specified in 49 CFR 192.5, "Class Locations".**
6. **Any gas in air reading, in a manhole, vault, or catch basin.**
7. **Any leak which, in the judgment of the representative at the scene, is regarded as potentially hazardous.**

Grade "2" - This classification shall designate a leakage condition which, due to its location and/or relative hazard potential, does not require immediate attention, but which shall be scheduled for repair within twelve (12) months or shall be rechecked during the next annual survey. Rechecked Grade "2" leaks which have not deteriorated may be rescheduled for repair if they are not in a hazardous location and the repair would be difficult or expensive. Grade "2" leaks include, but are not limited to:

(1) **Transmission line leaks not classified as Grade "1".**
(2) **A leak on a valve or component which has migrated beyond the valve box which in the judgment of the representative requires scheduled repair.**
(3) **Reading from a combustible gas indicator between 2% and 4% gas-in-air confined to a sidewalk in a paved area.**
(4) **Any Grade "3" leak which under frost conditions could migrate.**
(5) **A high density of Grade "3" leaks in the street of a business or residential area.**

Grade "3" - This classification shall designate a trace which due to its location and/or relative hazard potential does not require scheduled repair, but should be checked at least once a year to determine the current condition of the leakage.

112.23 Downtown District
A combustible gas indicator or Flame Ionization Unit survey using either mobile or walking of all gas, electric, water, telephone, and sewer manholes in the downtown district shall be conducted at least once each calendar year not to exceed 15 months. This survey will check all openings and cracks encountered in the streets. A map depicting the boundaries of the downtown district shall be accessible with the Gas Operator and shall be updated. All leaks determined to fall within the **Grade "1"** category shall be reported by the surveyor immediately to the responsible personnel. The responsible personnel shall dispatch a repair crew at once to the location of the leak. The crew shall repair the leak or, after investigation by barhole survey or other appropriate means, reclassify the leak and notify the responsible personnel who will schedule the repair at a later date.

If the surveyor discovers an explosive mixture in any manhole, he/she shall report this condition to the responsible personnel, who will notify the appropriate owner of the manhole by telephone, and later by letter, of the dangerous condition. The condition reported in the letter will be in effect until the repair crews have eliminated the hazard. The appropriate party shall be notified by letter after the leakage has been stopped. All leaks judged to be in the **Grade "2"** category shall be reported by the leak surveyor at the end of the workday. These leaks will be given to the appropriate responsible personnel who shall schedule repair work within a reasonable length of time. This time shall be governed by the leak location (Class Location).

Grade 3 leaks shall be reported and scheduled similar to Grade 2 leaks, but should be scheduled after Grade 1 and 2 leaks have been repaired.

112.24 Business Districts Other Than the Downtown District
(a) Areas where the majority of buildings on either side of the street are utilized for business use, such as, retail, wholesale, office, or service.
(b) Areas where the majority of buildings on either side of the street are high occupancy multistory buildings or buildings with multiple businesses that share common walls.
(c) Areas where gas facilities are under continuous paving that extends from the center line of the street to the building wall.

There shall be a combustible gas indicator survey of all manholes and street openings in these sections at least once each year not to exceed 15 months. The surveyor shall be familiar with areas where the gas mains are located in easements and shall survey the easements, particularly those in suburban shopping centers.

Alternatively, the survey may be conducted with flame ionization equipment using either a FI back pack unit or, where the mains are accessible, a mobile unit.

The leaks detected shall be reported and repaired in accordance with the provision outlined in 112.23, "Downtown District".

112.25 Residential and Rural Districts (Outside Business Districts)

Geographical areas for the purpose of surveying one area a year on a rotating basis may be changed from year to year because of growth or due to unaccounted for gas either high or unusual, but the area shall not be changed in which this action would prevent one-fifth of the gas distribution system from being surveyed each year so as to survey the entire gas system in five (5) years not to exceed 63 months. 192.723

Additional surveys may be conducted at the discretion of the Gas Operator. The leaks detected shall be reported and repaired in accordance with the provisions outlined in Section 112.23, "Downtown District".

112.26 Buildings of Public Assembly

Buildings of public assembly that are within a hundred (100) feet of a gas main or service (regardless of whether the building has a gas service) shall be surveyed annually with either a combustible gas indicator, using the bar hole method, or a flame ionization back pack unit. A building of public assembly is defined as one that regularly accommodates more than a hundred (100) people for economic, educational, health, religious, recreational, entertainment, or dining purposes. Buildings of public assembly include, but are not limited to, the following:

(A) Schools, colleges, and universities
(B) Hospitals
(C) Nursing and convalescent homes
(D) Churches
(E) Child care facilities
(F) Restaurants
(G) Theaters
(H) Night clubs
(I) Enclosed sports/entertainment arenas
(J) Museums
(K) Fairgrounds, amusement parks, and tourist attractions
(L) Convention centers
(M) Governmental assembly buildings
(N) Hotels and motels (with meeting room facilities)
(O) Malls and shopping centers
(P) Department stores
(Q) Supermarkets

112.3 Repair Procedures

The maintenance of mains and services shall consist of testing, repair, protection and replacement of the component parts. Plastic pipe and/or tubing insert renewals designed and installed in accordance with approved Construction Standards and Procedures, may be used as a method of renewal on distribution lines.

Temporary or permanent repairs shall be made on all lines which have a leak, corrosion pitting or other imperfection, or that receive damage which in the judgement of the representative of the Gas Operator would endanger the public.

When temporary repairs are deemed appropriate, permanent repairs shall follow as soon as possible.

Clamps and sleeves installed on mains and services shall be used and installed in accordance with manufacturer's installation instructions within the limits prescribed by the latest edition of 49 CFR Part 192. They shall be tested using the soap solution test.

Leakage on a bare steel or wrought iron main or service line should be corrected by complete replacement with plastic or with coated, wrapped, and cathodically protected steel.

112.4 Abandonment and Deactivation of Facilities

112.41 Abandonment of Distribution Facilities

When a gas main or service is abandoned, the responsible personnel in charge shall determine the necessity of purging the line, taking into consideration the location and size of the main or service. Under normal conditions, larger lines in the downtown district should be filled with water if practical. If the line is purged with air, tests will be made with a **combustible gas indicator** to insure that a combustible mixture does not exist.

After the line no longer contains an explosive mixture, the ends shall be filled with plugging material and cement, polyurethane or caps and or plugs. Abandonment of services or main two (2) inch thru ten (10) inch" for lines 10" and smaller and for lines larger than 10", a 1/4" thick circular plate or standard cap shall be installed on the ends of the pipe. All gas valve boxes shall be removed from the abandoned line and the stand pipes filled to grade with a suitable compacted material. **NOTE: UNDER NO CIRCUMSTANCE shall main line or service valve boxes remain on abandoned lines.**

112.42 Deactivation of Services

Whenever service to a customer is discontinued and the meter and/or service riser is left in place, the valve on the service riser shall be locked off. Where the inlet riser is equipped with a meter cock, the cock shall be closed and secured with an approved lock/pilfer proof locking device. Where the meter set utilizes plug valves, a locking device shall be placed on the meter inlet valve and, where present, on one bypass valve and shall be secured with either an approved padlock or barrel lock. CFR 49, 192.727.

112.5 Test Requirements

112.51 Steel Distribution Mains

Each new, replacement, or reinstated uprated main (except plastic) must be subjected to a minimum of ninety (90) psig or greater air pressure test prior to being purged with gas and put in service. **Tompkinsville Gas Operator implements a test pressure of 90 psig.** This test consists of putting the test pressure on the line after it has been welded together and installed in the trench and just prior to making the tie-in connections. **The prescribed pressure should be applied, an given time to stabilize (temperature stability), this observation period shall not be less than twenty (20) minutes.** In cases where it would not create an undue delay in the completion of the job, the pressure should be left overnight. If the line shows no discernible drop in pressure during the test period, the gauge will be removed and the section of main tested will be considered acceptable. A statement such as **"Pressure tested to 100 psig or greater"** or an equivalent statement must be shown on the service ticket. CFR 49, 725. All gas main lines shall be tested for a period not less than 24 hours.

Table 1 Soil Corrosiveness vs. Resistivity

Resistivity (Ohm-cm)	Soil Corrosivity Description
Below 500	Very Corrosion
500-1,000	Corrosive
1,000-2,000	Moderate Corrosion
2,000-3,000	Mildly Corrosive
Above 10,000	Progressively Less Corrosive

Table 2 Soil Conditions

Great Soil Group	Resistivity (ohm-cm)	Type of Soil	pH	Relative Corrosivity
Prairie	1,100-1,500	Gary clay with sand inclusions, wet	6.5-6.9	Corrosive
Dark brown and brown	3,000 – 5,000	Sandy loam, dry	6.5-6.9	Mildly corrosive
Podsol and gray-brown podsolic	500 – 1,100	Clay mixed with organic matter, wet	6.2	Very corrosive
Gray brown podsolic	350 - 500	Dense blue and brown clays, moist	6.8-6.9	Very corrosive
Gray-brown podsolic	5,000 – 9,000	Sand loam, moist	6.1-8.1	Mildly corrosive
Chernozem	2,380 – 2,500	Loam with over lay of white clay, dry	7.8-7.4	Mildly corrosive
Red and yellow	6,070 – 24,500	Loam and clays, wet	3.6-5.2	Moderately corrosive
Red and yellow	6,225 – 17,300	Heterogeneous red clay with sand, moist	6.3-7.2	Moderately corrosive

Soils of lower resistivity cause more rapid pitting attack to cast iron at rates that increase as the resistivity decreases.

Cast iron pipe is influenced by a number of factors: the presence of surface oxides that have been formed during the manufacturing process. The susceptibility of spun pipe (cast iron) to external corrosion can be increased by damage to the annealing oxide scale, which inevitably occurs during normal handling and installation. In corrosive environments, localized attack also tends to initiate at sites corresponding to the reverse peen marks on the external surface of cast iron pipe where the annealing oxide scale is generally thinner and more exposed to mechanical damage. The damage to the electrochemically is noble thermal oxide scale, which exposes the bare metal substrate which can lead to the formation of a galvanic cell between the relatively small area of bare iron (anode) and the reminder of oxide-coated pipe, which is more cathodic. The large ratio of cathodic to anodic areas, together with the fixed position of the damaged site, can provide the necessary conditions of localized corrosion.

Galvanic Corrosion

Galvanic reaction of dissimilar metals with copper services. Mixed metal system may accelerates corrosion where it is connected to iron piping which acts as the anode of a galvanic corrosion cell in which the copper acts as the cathode. Copper has an undeserved good reputation for corrosion resistance in soil environments because in many instances copper receives current produced by corroding iron, thus having a reduced corrosion rate.

Destruction from attack to service saddles that were joined to copper service lines confirmed to have been due solely to a galvanic corrosion.

Microbiologically Influenced Corrosion

Buried cast iron pipe can also be subject to microbiologically attack. Biological organisms fall under two groups based on the type of corrosion they engender: (a) anaerobic corrosion and (b) aerobic corrosion. Sulfate reducing bacteria (SRB) from the genera desulforvibrio are a typical example of anaerobic bacteria. If sulfides are found in the corrosion products, the presence of sulfate-reducing bacteria.

Biological attacks result from oxygen present in sulfates, nitrides, and carbonates. Microbacterial action can also provide anodic attacks on the pipe.

Corrosion Due to Dissimilar Electrolytes

Corrosion cells can develop on metal exposed to different electrolytes on long continuous pipeline that passes through different types of soils. Pipelines laid in sandy loam while another lie in clay can lead to corrosion cells as called "long line cells". In soils of low resistivity where such currents exit from the pipeline, causing the metal at the exit points is lost by anodic dissolution (corrosion). Anodes and cathodes may be miles apart.

Similarly, mixtures of soils in the backfill will cause corrosion. In the ground there are usually areas of varying nature which might form "geological batteries", i.e. galvanic cells. Clods of clay, for example, mixed into a sand backfill will lead to sever corrosion where the clay contacts the pipe. The same phenomenon causes corrosion on pipe exposed to soil and concrete or other highly alkaline backfill. Problems develop where a pipe passes through a concrete wall or floor. The resultant cells lead to corrosion of the portion of pipe exposed to the soil.

Corrosion cells may be developed as a result of different electrical (magnetic) ground currents. The changes in the ground currents are due to the earth's magnetic field or caused by lighting discharges.

6) Stray Current Corrosion

Stray current corrosion is caused by current flow through paths other than the intended circuit or by any unrelated currents in the earth. Metal structures buried in the ground, like pipelines, can often provide a better conducting path than the soil for earth-return currents from electric rail and tramway systems, electrical installations, and cathodic protection systems on nearby pipes. Routes can exhibit higher conductivity than a sheathed cable. Accelerated corrosion of the pipeline may occur at the point where the positive current flow leaves the pipe and enters into the earth.

The term "stray current corrosion" differs from other forms of corrosion in that the current, which causes the corrosion, has a source that is external to the affected structure. It may include the following different types of currents on buried or submerged metallic structures:

❶ Stray currents from direct current (DC) systems such as railways, trolley bus systems, cathodic or anodic corrosion protection systems, welding equipment in shipyards, and household appliances, etc.

❷ Interference currents such as HVDC (high-voltage direct current) power lines with full or partial ground return.

❸ Stray currents from alternating current (AC) systems such as AC currents from certain household appliances.

Joints gasketed offer resistance that may vary from a fraction of an ohm to several ohms but, sufficient magnitude that cast iron pipelines are considered to be electrically discontinuous (and are therefore unsuitable for cathodic protection without substantial modification). The rubber-gasket joints limit attack of cast iron by long-line stray currents, but not necessarily by local currents.

Polyethylene Encasement

Loose polyethylene jacket (encasement) is a standard corrosion control method specifically and favorably recommended by DIPRA for the protection of cast iron pipes in soils at landfill sites and in similar corrosive environments. Following this control method, the cast iron pipe is encased with either loose 8-mil (200 microns) low-density polyethylene or loose 4-mil (100 microns) high-density cross-laminated polyethylene.

There are strong disagreements about the benefits of polyethylene encasement.

It is critical to evaluate the soil and application conditions before using the polyethylene encasement method for corrosion protection for cast iron pipe.

Cathodic Protection

The sacrificial anode method utilizes galvanic anodes of zinc or magnesium that are packed in a low resistivity backfill, the chemical composition of which is selected such that anode polarization will be inhibited. Zinc has a lower corrosion potential and a lower protective current output so that it is practical use zinc anodes only in low resistivity soils, or where only a small cathodic protection current is required. Magnesium anodes have a larger protection current output and hence they are applicable over a wider range of soil resistivities, and can be used to protect larger pipe sizes.

Bonded Coatings

Bonded coatings control corrosion by creating a physical barrier that isolates the cast iron pipe from the surrounding corrosive soil environment.

Cold-applied tape coatings have been used for steel pipes but are strongly discouraged for protecting of cast iron pipe from corrosion because:
Combination sprayed zinc/sprayed bitumastic coatings are the most commonly used coatings for protection of the exterior of ductile iron pipe. This development led to the introduction of a flash of zinc spray, which was applied before the bituminous paint to impart a notional degree of sacrificial protection. In an attempt to overcome the inadequacies of three poor coating methods, it is not uncommon now to find that sprayed zinc/bitumastic coating and loose polyethylene encasement are applied together to cast iron pipes.

Other coatings such as cold applied laminated tape and epoxy coating, both fusion bonded and 100% solids thermosetting liquid epoxy, are used mainly for protection of the valves, tee-pieces, and other fittings for cast iron pipes.

4) Other Corrosion Control Methods

Insulated joints are used to break the metallic electrical connection between two pipelines, pipeline components or structures, thereby preventing the flow of electrical current between them. This method has limited applications in ductile iron pipes that use a rubber-gasket jointing system and are considered to be electrically discontinuous. Insulated joints often are used however, to isolate ductile iron pipelines from other underground structures that are cathodically protected or are part of an electrical grounding system. They may also be used at the junction of ductile iron pipe and copper service pipe to prevent galvanic current flow.

Trench improvement of corrosive soils to reduce their corrosive tendencies may provide only short-term protection to ductile iron pipeline. It has been observed, in many instances, that the substitute less corrosive backfilling material eventually takes on the characteristics of the surrounding soil.

References: NACE Task Group T-10A-21, "Corrosion Control of Ductile and Cast Iron Pipe", NACE publication 10A292, Item No. 54293, NACE.

112.52 Polyethylene (PE) Distribution Mains

In the case of new, replacement, or reinstated uprated plastic main, the above procedure shall apply with the following exceptions:

(1) **The test pressure must be at least 1 ½ times the maximum operating pressure or 50 psig, whichever is greater, but shall not exceed three (3) times the design pressure of the pipe. Polyethylene 3408 intended to operate at high pressure (HP) shall be tested to a minimum of 150 psig not to exceed 240 psig.**

(2) **The temperature of the pipe must not exceed 100°F during the test.**

112.53 Steel Distribution Services

Each new, replacement, or reinstated uprated service (except plastic) must be subjected to a minimum of 90 psig or greater air pressure test prior to being put in service. This test will consist of pressurizing the service line after it has been welded and all work completed except the final connection at the main. This test may be performed either after service is connected to the service tee and before it has been tapped, or just prior to placing the service in the trench. The pressure test shall consist of a decay test (drop test) to be observed for a minimum of five (5) minutes after the section to be tested has been isolated from the pressurizing medium (air). If the service line shows no drop in pressure during this five (5) minute period, the gauge will be removed and the service line considered acceptable. A statement such as "Pressure tested to 100 psig" or an equivalent statement must be shown on the service ticket. (Any points or connections made after the test should be soap tested after the line has been pressurized with natural gas).

112.54 Polyethylene (PE) Distribution Services

In the case of new, replacement, or reinstated uprated plastic services, the above procedures shall apply with the following exceptions:

(1) **The test pressure must be at least 1 ½ times the maximum operating pressure or 50 psig, whichever is greater, but shall not exceed three times the design pressure of the pipe (tubing). Polyethylene 3408 intended to operate at high pressure (HP) shall be tested to a minimum of 150 psig not to exceed 240 psig. Pressure tests shall be monitored for 24 hours.**

(2) **Temperature of the pipe (tubing) must not exceed 100 °F during the test.**

112.55 Tracer Wire (See: 105.26)

(a) General. Blocking should not be used to support plastic pipe. Plastic pipe should be laid on undisturbed soil, well-compacted soil, well-tamped soil, or other continuous support. If plastic pipe is to be laid in soils which may damage it, the pipe should be protected by suitable rock-free materials.
(b) Backfill material. Backfilling should be performed in a manner to provide firm support around the piping. The material used for backfilling should be free of large rocks, pieces of pavement, or any other materials that might damage the pipe.
(c) Consolidation. If trench flooding is used to consolidate the backfill, care should be taken to see that the piping is not floated from its firm bearing on the trench bottom. Where mains and service lines are installed in existing or proposed roadways or in unstable soil, flooding should be augmented by wheel rolling or mechanical compaction. Multi-lift mechanical compaction can be used in lieu of flooding. Care should be taken when using mechanical compaction not to cause excessive ovality of the plastic pipe.

Means of locating.

(a) Tracer Wire.

(1) A bare or coated corrosion-resistant metal wire may be buried along the plastic pipe. Wire size #12 or #14 AWG is commonly installed.
(2) Tracer wire may be installed physically separated from, or immediately adjacent to, the plastic pipe. Separation may lead to difficulty in accurately locating the plastic pipe. In determining placement of tracer wire relative to plastic pipe, the operator should consider the relative importance of locating the pipe versus potential pipe damage from a current surge through tracer wire. Lightning strikes are a source of current surges.
(3) Tracer wire should not be wrapped around plastic pipe. It may be taped to the outside of the plastic pipe, especially for installation by boring or plowing-in, or placed loosely in the trench directly adjacent to the pipe.
(4) A separation of 2" to 6" between plastic pipe and tracer wire is commonly used where current surges, such as from lightning, have been experienced or can be expected.
(5) Leads from tracer wire into curb boxes and valve boxes and on outside service risers can be used for direct connection of locating instruments. Consideration should be given to ensuring that no bare tracer wire is exposed such that a lightning strike could cause a current surge through the wire.
(6) Splicing of tracer wire, if necessary, should be done in a manner to produce an electrically and mechanically sound joint which will not loosen or separate under conditions to which it may be subjected such as backfilling operations and freeze-thaw cycles.
(7) Tracer wire should not be electrically connected to any other metallic structures such as steel or cast iron pipe to which the plastic is connected.
(8) Additional information may be obtained from A.G.A. XR9401, "Plastic Pipe Manual for Gas Service."
(b) Metallic tape. A metallic coated or corrosion-resistant metallic tape may be installed along with the plastic pipe. Care should be taken so that the tape is not torn or separated during backfilling operations. Metallic locating tape normally has no accessible leads for connecting locating equipment, making it necessary to use a passive or induced current locating device.
(c) Mapping. Accurate mapping of plastic pipe with dimensions referenced to permanent landmarks such as lot lines or street centerlines is an acceptable method of locating plastic pipe.
(d) Passive devices. Tuned coils or other passive devices may be buried at strategic points along a plastic pipeline. These devices can be located from above ground by means of an associated locating instrument.

Warning tape.

A highly visible warning tape may be used in addition to one of the means for locating the pipe. Such tapes are usually yellow with a legend such as "Warning: Buried Gas Pipeline." Warning tapes are generally installed approximately 12" directly above the plastic pipe so that it will be struck first by someone digging in the vicinity.

113 Maintenance of Pressure Limiting Equipment

113.1 Regulators

113.11 Gate and District Regulator Stations

113.111 Once each week the gate stations and district/border regulator installations shall be visually inspected for performance and appearance. Any abnormal condition found shall be either corrected or scheduled for repair, as appropriate, and shall be noted on a daily work record.

113.112 Annual Inspections

Once each calendar year, at intervals not to exceed fifteen (15) months, each regulator, flow control device and accompanying equipment shall be routinely inspected. During the inspection, regulators will be inspected for lock-off, controllers should fully open and close valves, and proper set points shall be verified. Appropriate steps shall be taken to correct or repair any malfunctions that are found. The inspection shall follow a procedural checklist which, upon completion, shall be dated and signed by the responsible personnel and recorded.

113.113 Major Inspections

Major inspection on flow control devices shall be performed on an as-needed basis. All other regulators such as (industrial regulators)(master meter operator(s)) regulator and accompanying equipment shall be subjected to an inspection every 36 months, not to exceed (39) months.

During this inspection, the equipment shall be disassembled and all parts carefully examined for wear or defect. Any parts found to be defective shall be replaced and properly adjusted. This inspection shall proceed according to a procedural checklist which, upon completion, shall be dated and signed by the responsible personnel and recorded.

113.12 Regulators/Large Commercial and Industrial Customers

Regulators supplying large commercial and industrial customers and which are owned by the Gas Operator shall be given a major inspection every 3 years, not to exceed 39 months or more frequently if operating conditions dictate. The inspection, when possible, shall coincide with the customer's shutdown for plant maintenance or by-passed by experienced personnel. These inspections shall follow the procedure set forth for gate stations and district regulator installations. Regulators owned by the customer are not subject to inspection or maintenance by the Gas Operator.

113.13 House Service Regulators

Regulators supplying residential customers shall be inspected for proper operation each time the customer's gas meter is changed and each time a service call is made to a customer's house due to a malfunction of the Gas Operators equipment. Note: **Normally, a malfunctioning regulator should be replaced rather than repaired on site.**

113.21 Safety Relief Valves/Monitoring System/Security Valves

Safety relief valves, monitor regulators and security valves used to control over-pressurization at gate stations and district regulator stations shall be inspected once each year, at intervals not to exceed fifteen (15) months. The set point of the relief valve shall be confirmed at the time of the annual inspection. **Relief settings shall be established at and not exceeding the MAOP of the system plus 6 psig for systems operating between 12-60 psig and 10% above the MAOP for systems operating above 60 psig. Metering systems delivering pressures measured at 5 psig upstream/downstream of the meter shall provide overpressure protection (customer owned fuel lines.) The customer shall provide regulation which reduces the pressure to 0.5 psig and less. Manufacturing requirements and local Code Enforcement shall possess the Authority Having Juridiction. The relief capacity of these systems shall be set at 50% above delivery pressure (7.5 psig.) NOTE: Relief OPPD's shall not be installed at (public schools/private schools, day care, rehabilitation centers, hospitals, convalescence homes, Institutional" buildings etc.) OPPD's for the list above shall be controlled by security valves. (See: 113.21 Over-Pressure Protection (h).)**

The Gas Operator will review the calculated required capacity of those relief devices protecting the distribution system and compare calculations with the rated capacity of the pressure control device. Any problems found will be corrected. **NOTE: All relief valves shall possess a manual cut-off valve ahead of the relief and shall be locked in the open position. The relief valve should posses a blow-off pipe that incorporates an attached blow-off cap or movable pressure flap. 192.199(e).**

Safety relief valves at customer metering facilities which are owned by the Gas Operator shall be given a visual inspection each time the regulator is inspected. Set point confirmations or capacity determinations of such relief device are not required. Relief devices owned by the customer are not subject to inspection and maintenance by the Gas Operator.

Over-Pressure Protection

a. Over-pressure protection devices shall be provided to prevent the gas pressure in the piping system from exceeding that value which would cause unsafe operations of any connected and properly adjusted gas utilization equipment. These pressure limiting or pressure relieving devices shall be set so that the pressure shall not exceed a safe level beyond the maximum allowable working pressure for the piping and appliances connected.
b. Pressure limiting or pressure relieving devices shall be installed according to the manufacturer's installation instruction, the utility and "Local Code Enforcement" requirements.
c. All over-pressure protection devices shall be designed and sized using safe engineering practices based on gas pressure available and total load requirements of the gas piping system.
d. Piping systems and appliances designed to operate on 7" water column pressure can be over-pressure protected by a regulator equipped with an "internal relief valve" normally adjusted to relieve gas pressure to the atmosphere when the pressure in the line exceeds the lockup pressure.
e. Piping systems designed to operate on 2 PSIG can be over-pressure protected by a regulator equipped with an "internal relief valve" normally adjusted to relieve gas pressure to the atmosphere when the pressure in the line exceeds the lockup pressure.
f. Piping systems designed to operation 5 PSIG can be over-pressure protected by a regulator equipped with an "internal relief valve" or a separate relief valve normally adjusted to relieve gas pressure to the atmosphere when the pressure in the line exceeds 50% above delivery pressure (7.5 PSIG.)
g. Piping systems designed to operate on elevated pressures higher than 5 PSIG and up to 100 PSIG, do not have to be over-pressure protected. However, all regulator stations installed in the system, or at the gas utilization equipment shall meet the above requirements.
h. The utility takes exception to any over-pressure protection device that relieves pressure to the atmosphere installed at "Public and Private , Schools", "Hospitals", or other "Institutional" buildings. The requirement for these installations is that the over-pressure device must provide complete shut-off verses relief capabilities.

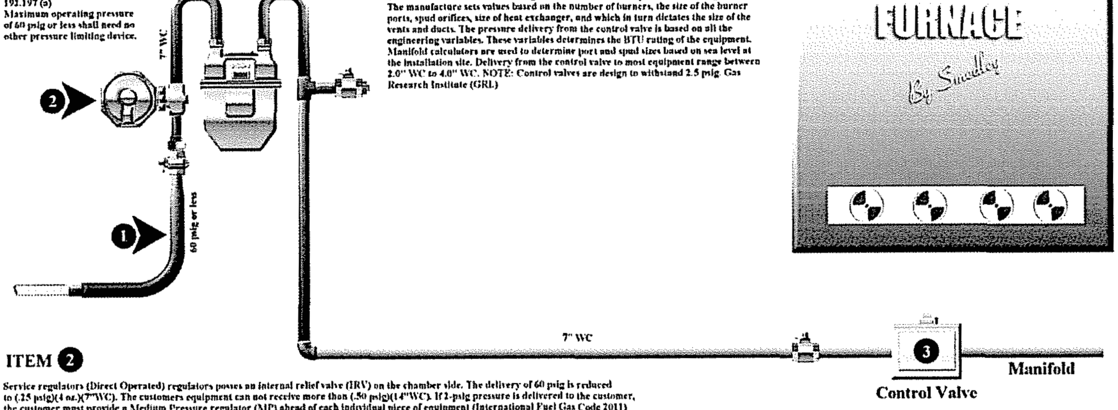
Residential Meter Center

ITEM 1

192.197 (a)
Maximum operating pressure of 60 psig or less shall need no other pressure limiting device.

ITEM 3

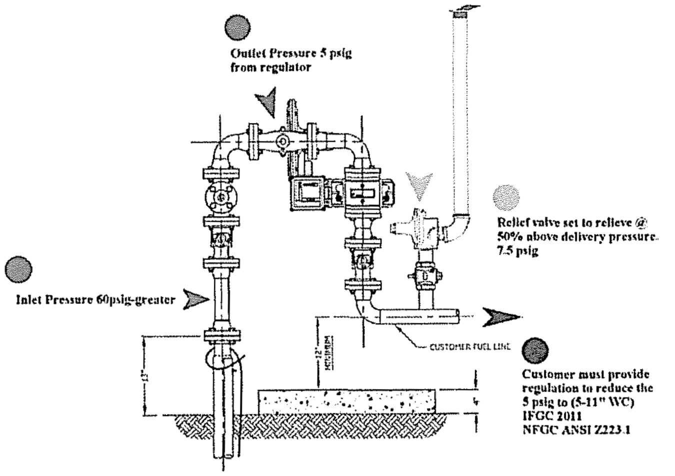
The control valve which delivers gas to the burns is also a pressure reducing device. The manufacture sets values based on the number of burners, the size of the burner ports, spud orifices, size of heat exchanger, and which in turn dictates the size of the vents and ducts. The pressure delivery from the control valve is based on all the engineering variables. These variables determines the BTU rating of the equipment. Manifold calculators are used to determine port and spud sizes based on sea level at the installation site. Delivery from the control valve to most equipment range between 2.0" WC to 4.0" WC. NOTE: Control valves are design to withstand 2.5 psig. Gas Research Institute (GRI.)



ITEM 2

Service regulators (Direct Operated) regulators poses an internal relief valve (IRV) on the chamber side. The delivery of 60 psig is reduced to (.25 psig)(4 oz.)(7"WC). The customers equipment can not receive more than (.50 psig)(14"WC). If 2-psig pressure is delivered to the customer, the customer must provide a Medium Pressure regulator (MP) ahead of each individual piece of equipment (International Fuel Gas Code 2011) (National Fuel Gas Code ANSI Z223.1.) If 5-psig systems are provided for the cutomer, the installing agency must provide protection by installing a (relief or security valve) for equipment protection. The customer must provide regulation downstream of the meter to reduce the 5-psig to (5-11"WC.) The relief valve protects the piping and equipment from the potential pressure at the main (60 and greater.) The relief setting of 50% above delivery pressure is based on delivery pressure of 5-psig, which is maximum delivery to the customer (per the manufacture, the IFGC 2011 and NFGC ANSI Z223.1.) Requirements for qualification for pressure systems above (.25 psig)(4 oz.)(7"WC) see Metering System Pressures #1.

Commercial/Residential Meter Center



Over-Pressure Protection

a. Over-pressure protection devices shall be provided to prevent the gas pressure in the piping system from exceeding that value which would cause unsafe operations of any connected and properly adjusted gas utilization equipment. These pressure limiting or pressure relieving devices shall be set so that the pressure shall not exceed a safe level beyond the maximum allowable working pressure for the piping and appliances connected.
b. Pressure limiting or pressure relieving devices shall be installed according to the manufacturer's installation instruction, the utility and "Local Code Enforcement" requirements.
c. All over-pressure protection devices shall be designed and sized using safe engineering practices based on gas pressure available and total load requirements of the gas piping system.
d. Piping systems and appliances designed to operate on 7" water column pressure can be over-pressure protected by a regulator equipped with an "internal relief valve" normally adjusted to relieve gas pressure to the atmosphere when the pressure in the line exceeds the lockup pressure.
e. Piping systems designed to operate on 2 PSIG can be over-pressure protected by a regulator equipped with an "internal relief valve" normally adjusted to relieve gas pressure to the atmosphere when the pressure in the line exceeds the lockup pressure.
f. Piping systems designed to operation 5 PSIG can be over-pressure protected by a regulator equipped with an "internal relief valve" or a separate relief valve normally adjusted to relieve gas pressure to the atmosphere when the pressure in the line exceeds 50% above delivery pressure (7.5 PSIG.)
g. Piping systems designed to operate on elevated pressures higher than 5 PSIG and up to 100 PSIG, do not have to be over-pressure protected. However, all regulator stations installed in the system, or at the gas utilization equipment shall meet the above requirements.
h. The utility takes exception to any over-pressure protection device that relieves pressure to the atmosphere installed at "Public and Private , Schools", "Hospitals", or other "Institutional" buildings. The requirement for these installations is that the over-pressure device must provide complete shut-off verses relief capabilities.

Over-Pressure Protection/Limiting Stations

Discharge stacks or vents of all pressure relief devices should be located where gas can be discharged into the atmosphere without undue hazard and should be protected with rain caps to preclude the entry of water. Another factor to be considered which influences performance is the location of the control line connections (where applicable). Turbulence associated with flow through valves, elbows, swages, or other flow restrictions can cause localized areas of high and low pressure. If the relief valve control line connection is made in an area of turbulent flow, the relief valve may sense transient or localized overpressure and mistakenly begin venting gas. Therefore, the downstream tap should be located 4 to 10 main pipe diameters downstream of the upstream regulator. In high flow applications, turbulence may be greater and the control line connection should be made even further downstream. However, long control lines can act as a flow restriction. When sizing control lines the manufacturer's recommended line size for runs up to 20 feet shall be used. If the line is longer, increase the control line one pipe size for each additional 20 feet of control line.

The same rules for regulator sizing apply equally to monitor systems with a reduction in capacity to be taken into consideration due to the regulators in series. Two equal-capacity regulators in series have a combined capacity of approximately 70% of one of them; a rule of thumb for finding the combined capacity of two regulators of unequal size is to take 70% of the mean. It is necessary to take into account the pressure drop (Δ P2) across both regulators while they are operating at the maximum capacity.

Where ends of casing are below ground they shall be suitable sealed to outside of carrier pipe.

Where ends of casing are at or above ground surface and above high-water level they may be left open, provided drainage is afforded in such manner that leakage will be conducted away from railway tracks, roads, thoroughfares or structures. Where proper drainage is not provided, the ends of casing shall be sealed.

Casing pipe, when sealed, shall be properly vented. Vent pipes shall be of sufficient diameter, but in no case be less than 2 inches in diameter, shall be attached near end of casing and project through ground surface at right-of-way lines or not less than 45 feet (measured at right angles) from nearest center line of railway tracks, roads, thoroughfares or structures. Vent pipe, or pipes, shall extend not less than 4 feet above ground surface. Top of vent pipe shall be fitted with down-turned elbow properly screened, or a relief valve. Vents in locations subject to high water shall be extended above the maximum elevation of high water and shall be supported and protected in a manner that meets the approval of the engineer. Vent pipes shall be at least 4 feet from aerial electric wires.

Accessible emergency shut-off valves shall be installed within effective distances each side of the railway as mutually agreed to by the engineer and the pipeline company. Where pipelines are provided with automatic control stations at locations and within distances approved by the engineer, no additional valves shall be required.

Automatic controlling stations used to transport oil, liquified petroleum gas, natural or manufactured gas and or other flammable products under railway tracks, roads, thoroughfares or structures shall provide a minimum clearance distance of 50 feet (measured at right angles) from center line of outside railway track, road, thoroughfare and or traffic area and shall extend 2 feet beyond toe of slope or 25 feet beyond the ends of casing (when casing is required), whichever is greater. The construction of the carrier pipe shall be of metal and conform to the requirements of the current ANSI B 31.4 Liquid Petroleum Transportation Piping Systems, B 31.8 Code for Gas Supplier and Distribution Piping Systems, and other applicable ANSI codes, except that the maximum allowable stresses for design of steel pipe shall not exceed the following percentages of the specified minimum yield strength (multiplied by longitudinal joint factor) of the pipe as defined in the above codes.

Approval of the plans for proposed installation shall be submitted to and meet the approval of the engineer before construction is begun. Plans shall be drawn to scale showing the relation of the proposed pipeline to railway tracks, roads, thoroughfares, structures, angle of crossing, location of valves, railway survey station, right-of-way lines and general layout of tracks and railway facilities. Plans should also show a cross section (or sections) from field survey, showing pipe in relation to actual profile of ground railway tracks, roads, thoroughfares or structures. If open-cutting or tunneling is necessary, details of sheeting and method of supporting tracks or driving tunnel shall be shown. A culvert, under railway bridges shall not be closer than 45 feet to any portion of any railway bridge, building or other important structure, except in special cases and then by special design as approved by the engineer.

Transporting of hazardous materials through liquified petroleum gas or natural gas liquid pipelines, where practicable, may cross railways where tracks are carried on an embankment. Pipelines laid longitudinally on a railway rights-of-way shall be located as far as practicable from any tracks or other important structures. If located within 25 feet of the center line of any track or closer than 45 feet to nearest point of any bridge, building or other important structure, the carrier pipe shall be encased or of special design as approved by the engineer.

Any replacement of a carrier pipe shall be considered a new installation, subject to the requirements of these specifications. Where laws or orders of public authority prescribe a higher degree of protection than specified herein, then the higher degree of protection so prescribed shall be deemed a part of these specifications. Pipelines and casing pipe shall be suitably insulated from underground conduits carrying electric wires on railway right-of-ways. All pipelines, except those in streets, shall be prominently marked at the right-of-ways (on both sides of track for under crossings) by signs substantially worded thus: **"High pressure main 5 feet under."**

Protective Post Locations:

1. Protective posts are defined as steel pipe barriers used to protect a gas meter, regulator, or other gas component that may be damaged by cars, trucks, or other traffic. Typical 3" black steel pipe posts are used where cars or large trucks might endanger a meter center. 3" protective posts must be buried 30" in the ground and set in concrete. They must extend 36" above the ground and be filled with concrete. 6" protective posts must be buried 36" in the ground and set in concrete. They must extend 48" above the ground and filled with concrete.

Protective posts must extend a minimum of 6" beyond the end of the gas meter or piping arrangement spread, and set on a minimum of 24" centers.

a. 3" protective posts are to be used to protect the utility's gas meter centers, regulators, risers or any other gas installation on residential sites. Residential, in this definition, is to include single family dwellings, duplexes, condominiums and apartments and all other non-commercial projects where "car traffic" only will be encountered.
b. 6" protective posts are to be used to protect the utility's gas meter centers, regulators, risers or any other gas installation on commercial sites. Commercial, in this definition, is to include individual businesses, shopping centers, business parks and all other non-residential establishments where "car and truck traffic" will be encountered.
c. Protective posts for single residential gas meter centers thru 9 meter headers or stack headers, header mounted, meter centers. The size of protective posts is to be determined by site requirements.
2. All public or private schools within the utility's Authority of Jurisdiction that conduct classes of education at the first grade level, or higher, will be classified as an "Industrial Customer." All buildings on the entire property, whether gas is used in that building or not, is considered to be under utility's authority and shall adhere to all rules and regulations for "Industrial Customers." All buildings on that property must adhere to these rules:
a. The gas meter will be set on a 11'-0" spread, regardless of gas demand.
b. The gas meter will be installed within a 7' x 13' x 6'-6" high chain link fence enclosure with chain link top, set on a 7' x 14' x 4" thick concrete slab.

114 Valve Maintenance

All valves located on any and all gas facilities shall be repaired or replaced as deemed necessary. This action shall be immediate.

114.11 All underground valves

114.111 Above ground distribution valves

114.122 Regulator station valves

114.123 Meter station valves

114.3 Gas Distribution Valves

Control valve definitions are as follows:

(1) All valves four (4) inches or larger in size that are used to provide safe operation of the system. Valves on the end of a gas line that are to be used for future extension are not considered control valves.
(2) All numbered valves, regardless of size.
(3) All underground valves, regardless of size, at the inlet to regulator stations.
(4) All numbered valves, regardless of size, coming off lines four (4) inches or larger in size (except tap valves in series with a numbered plug valve).
(5) Any other valves which are deemed critical in the event of an emergency because of the configuration of the downstream system.

All mainline or service control valves shall be designated for the safe operation of the system and shall be inspected at least once each calendar year not to exceed 15 months. These inspections shall consist of cleaning the valve boxes, operating the valve as much as possible and servicing as necessary. The inspection of each valve shall include verification of the valve's location and the presence of a valve box over the underground control valve. If a location correction is necessary, a record showing the correct location shall be completed and filed with the Gas Operator. Tompkinsville personnel shall schedule maintenance of each valve in the system.

If the valve box is not of the proper type, it shall be scheduled for changing of the valve box or cover. A record of each inspection shall be kept by the Gas Operator.

114.4 Valve Operations Procedure
Valve operation procedures are as follows:

1. **All numbered valves and regulator control valves are under the jurisdiction of the Gas Operator. These valves are not to be operated except on his/her order unless damage to life or property is imminent. In such cases, field personnel should act according to their best judgement and report in full, to the Gas Operator immediately afterward.**
2. **To get immediate action from the Gas Operator due to an emergency, the authorized person in the field requesting the valve closed shall use the word emergency. This request is granted only if it is in the Gas Operator's judgement the valve should be closed. The person making the emergency request of the Gas Operator will assume the responsibility for the outage.**
3. **All routine orders from the Gas Operator will be given in the proper sequence of operation. Orders do not become effective until the authorization has been approved and given.**
4. **It is essential that field personnel carry the written order with them while performing duties.**
5. **In case of an emergency, the Gas Operator may issue a verbal valving order to field personnel to save time in execution. In this case, the Gas Operator should make a record of the authorized order, time**

issued, etc. in the space provided for recording orders on a log sheet and mark it as a verbal order.

6. When field personnel are working on accompanying equipment over which the Gas Operator has no jurisdiction, the responsible personnel will be held responsible for notification to the Gas Operator.
7. Operating valves will be done in such a manner that customer outage will not be interrupted.
8. While executing the order, if the Gas Operator calls by telephone or radio, field personnel shall answer the call immediately before completing the order.
9. Orders are to be carried out promptly, unless field personnel consider the order incorrect. In such cases, field personnel may discuss the order with the Gas Operator. If there is still some doubt concerning the order, the Manager of the Gas System shall determine it's correctness. If the Manager of the Gas System insists on the original order, the order is to be carried out as given.

114.5 Critical Valves

TRANSMISSION VALVES					
NUMBER	SIZE	MATERIAL	WORKING PSIG	MAKE	VALVE MAP
1 HP	3"	Steel	400	Nordstrom	176/85
2 HP	3"	Steel	400	Nordstrom	143/00
3 HP	3"	Steel	400	Nordstrom	90/00
4 HP	3"	Steel	400	Nordstrom	44/00
DISTRIBUTION VALVES					
NUMBER	SIZE	MATERIAL	WORKING PSIG	MAKE	VALVE MAP
1 LP	4"	Steel	150	Nordstrom	4th & 6th
3 LP	2"	Steel	150	Nordstrom	6th & Lake
4 LP	2"	Steel	150	Nordstrom	7th & Columbia
5 LP	2"	Steel	150	Nordstrom	Main & Page
5A LP	2"	Steel	150	Nordstrom	Main & Page
8 LP	2"	Steel	150	Nordstrom	Main & Hollywood
11A LP	2"	Steel	150	Nordstrom	5th & Columbia
18 LP	2"	Steel	150	Nordstrom	4th & Jackson
19 LP	2"	Steel	150	Nordstrom	2nd & Jackson
23 LP	2"	Steel	150	Nordstrom	Main & Magnolia
24 LP	2"	Steel	150	Nordstrom	Crawford & Magnolia
25 LP	2"	Steel	150	Nordstrom	4th & Crawford
26 LP	2"	Steel	150	Nordstrom	4th & Magnolia

116 Maintenance of Pressure Surveillance Equipment

116.1 Pressure Transmitters

All transmitters shall be given a visual inspection and pressure check (at operating pressure) annually. Calibrations are to be performed as needed, with a **maximum interval between calibrations of thirty-six (36) months.**
All electronic transmitters and transducers shall be inspected and calibrated annually. Such equipment is operated and maintained by the gas operator.

116.2 Pressure Recorders in the Field

Field recorders shall be calibrated every twelve (12) months with records kept as to found and left conditions.

117 Safety Procedures

117.1 General

Precautions shall be taken to prohibit smoking or other sources of ignition in an area where the leakage or presence of gas may constitute a hazard of fire or explosion. Welding shall not be performed in an area containing a gaseous atmosphere except when welding small pits on low stress level piping or when welding in accordance with Section 117.23.

Relevant signs, warning devices and/or barricades shall be used to route traffic as far from the area as practical.

117.2 Purging Gas Lines

When it is necessary to blow down a pipeline or fill a pipeline containing air with natural gas, the following procedures shall be followed regardless of the operating pressure.

117.21 When a pipeline containing air is to be placed in service, the air may be safely displaced with gas by introducing a moderately rapid rate of flow through the pipeline and out a vent at the opposite end. The flow should be continued without interruption (eliminating air slug) until the vented gas is free from air. The medium shall be monitored by a combustible gas indicator (CGI) to ensure 100% CH_4 Methane/Natural Gas is present. The vent shall then be closed. Whenever possible, a "squeegee" type pig or a slug of inert gas should be used to separate the gas and air to minimize the possibility of an explosive mixture. **NOTE: The purge medium shall be monitored by CGI at all times.**

117.22 In cases where gas in a pipeline is to be displaced with air, an approved procedure shall be used. If the rate of air that can be supplied is not sufficient to create a turbulent flow of air, then a "squeegee" pig or slug of inert gas must be used. If there is a reason to suspect the presence of a volatile flammable liquid, precautions should be taken to minimize the possibility of striking static sparks within the pipeline. See: Section 117.6 Static Electricity.

117.23 Before cutting or welding is done on a pipeline that contains gas, it must be disconnected from all sources of gas and then purged with air, water, or inert gas; or the operation may be carried out in accordance with the following procedures:

117.231 Keep the pipeline full of gas and maintain a slight flow of gas toward the point where cutting or welding is being performed.

117.232 Control the gas pressure at the point of cutting and welding with a blow-off valve or other suitable means.

117.233 Close all slots or open ends immediately after they are cut with suitable material.

117.234 Do not permit two (2) openings to remain uncovered at the same time. This is especially important if the two (2) openings are at different elevations (migration venting).

117.24 No welding or cutting will be performed on a pipeline that contains air and is connected to a source of gas, unless approved means have been provided to prevent leakage of gas into the pipeline.

117.25 All welding performed in vaults, tanks or other structures which contain or have contained gas must be performed according to **approved welding procedures for hot work in confined spaces. Hot work permits will**

be required for welding in all such enclosures and must be obtained through the Gas Operator.

117.3 Safety Concerns

Working safely such as shoring, barricading, channeling, testing for combustibles, entering ditches, using tools, welding, torch cutting, coating, etc., shall be performed in accordance with known safe practices using approved safety procedures.

117.4 Procedure for Entering a Valve or Regulator/Confined Space

If a gas system possesses vaults or equipment enclosures the representative of the Gas Operator is required to see that safety precautions are observed in accordance with approved "Confined Space Entry Guidelines."

117.5 Procedures for Entering Trenches and Excavations

Qualified representative of the Gas Operator shall be responsible for ensuring his/her entrance and exit from a trench or excavated enclosure.

When an employee(s) are required to enter a trench or excavation where an accumulation of gas or vapor exists, or is suspected to exist, the representative of the Gas Operator shall perform the following procedures:

1. **The trench or excavation shall be tested for hazardous atmospheres prior to entry.**
2. **If an explosive, flammable, toxic or oxygen-deficient atmosphere exists in a trench or excavation, forced air ventilation shall be provided. Continuous monitoring shall be performed to ensure the atmosphere is free of hazardous concentrations while the excavation is occupied.**
3. **If the hazardous atmosphere cannot be eliminated by use of forced air ventilation, the following rescue and protective equipment must be utilized during entry into the trench or excavation:**
4. **Personnel working in hazardous gas areas must be protected from the environment by means of rescue harness, line, breathing apparatus, fire extinguisher and other means designed to protect life and property. See: 192.605-615**

    a. Self-contained breathing apparatus (SCBA Unit)(Tested quarterly)(Verify correct pressure.)
    b. Fire extinguisher (Tested quarterly)(Verify correct pressure.)
    c. Rescue harness and lifeline
    d. Hard hat
    e. Gloves

117.6 Static Electricity/See: Emergency Procedure Manual

When it is necessary to repair, tie-in or purge PE gas lines, the following procedures shall be followed:

117.61 Place manned fire extinguisher near the bellhole, observe the direction of blowing gas and wind direction.

117.62 If possible, isolate by closing off the effected segment of the piping.

117.63 If the use of shut-off valves are not possible:

1. **Open three (3) bellholes, one (1) bellhole at the repair location, tie-in or purge point. Open bellholes on upstream and downstream section of same pipeline in relation to the first bellhole.**
2. **Before entering the ditch, shake the Anti-Static fluid thoroughly, spray the anti-static fluid onto the PE pipe or tubing surface as the pipe is being exposed. Continue to wet the entire pipe surface and the dirt contacting the pipe until pipe is completely exposed.**

3. **Bury 6" of the polyethylene wrap in the dirt and wet the area with the Anti-Static solution. Secure the wrap by making one turn around the pipe perpendicular to its length, while pulling the wrap taut. Wrap the entire length of exposed pipe, overlapping wrap by one half, and bury the opposite end of the wrap. Ground rods with clips can be used in addition to burying each end in the dirt and wetting with the Anti-Static solution. Ground rods can also be used to ground tools used in making repairs after ends of the wrap have been grounded into the ditch banks.**
4. **REMEMBER: Spray PE pipe with the Anti-Static solution when pipe is first being exposed or before entering excavation. Spray after pipe has been wrapped with the polyethylene wrap and keep a film of the Anti-Static solution on the wrapped pipe.**
5. **Place squeeze-off tools in both downstream and upstream bellholes making sure squeeze-off tool has a grounding strap and said strap is grounded.**
6. **Spray Anti-Static solution on polyethylene wrap and outer surface of pipe. Wrap pipe, making sure both ends are in contact with the ground. Repair cut or tie-in PE pipe.**
7. **For purging, either utilize shut off valve or squeeze off tool. Follow the above wrapping procedures and use of the Anti-Static solution for the safe discharge of static electricity on PE pipe. NOTE: The Department of Transportation has recommended that all purging through PE pipe be performed through a steel riser or a steel pig-tail. This being done to discharge the static charge associated with PE Plastic Pipe.**

CLEANING PREPARATION FOR FUSION

Remove wrap to expose the working area on the PE pipe for fusion. Clean the Anti-Static solution from the PE pipe twice by flushing liberally with clean clear water and by wiping dry with clean disposable dry cloth. Spray PE pipe with alcohol and wipe off with a clean dry cloth. This must be done, prior to scraping, in preparation for installation of a saddle fusion tee, an electrofusion tee, an electrofusion coupling, or a butt fusion.

(a) General. A plastic pipe joint that is joined by solvent cement, adhesive, or heat fusion may not be disturbed until it has properly set. Plastic pipe may not be joined by a threaded joint or miter joint.
(b) Solvent cement joints. Each solvent cement joint on plastic pipe must comply with the following:

(1) The mating surfaces of the joint must be clean, dry, and free of material which might be detrimental to the joint.
(2) The solvent cement must conform to ASTM Designation D 2513.
(3) The joint may not be heated to accelerate the setting of the cement.
(c) Heat-fusion joints. Each heat-fusion joint on plastic pipe must comply with the following:

(1) A butt heat-fusion joint must be joined by a device that holds the heater element square to the ends of the piping, compresses the heated ends together, and holds the pipe in proper alignment while the plastic hardens.
(2) A socket heat-fusion joint must be joined by a device that heats the mating surfaces of the joint uniformly and simultaneously to essentially the same temperature.
(3) An electrofusion joint must be joined utilizing the equipment and techniques of the fittings manufacturer or equipment and techniques shown, by testing joints to the requirements of 192.283(a)(1)(iii), to be at least equivalent to those of the fittings manufacturer.
(4) Heat may not be applied with a torch or other open flame.
(d) Adhesive joints. Each adhesive joint on plastic pipe must comply with the following:
(1) The adhesive must conform to ASTM Designation D 2517.
(2) The materials and adhesive must be compatible with each other.
(e) Mechanical joints. Each compression type mechanical joint on plastic pipe must comply with the following:

(1) The gasket material in the coupling must be compatible with the plastic.
(2) A rigid internal tubular stiffener, other than a split tubular stiffener, must be used in conjunction with the coupling.

(Plastic-to-plastic and plastic-to-metal)
Skillful application of qualified procedures and the use of proper materials and equipment in good condition are needed to achieve sound joints in plastic piping. Joints should be made by personnel qualified by training or experience in the written procedures required for the type of joint involved.

(Plastic-to-plastic)

Solvent cement or heat-fusion joints should be made only between components made of the same basic thermoplastic materials. Heat-fusion or mechanical joints should be used when joining polyethylene components. Combinations of PE 2306, PE 2406, PE 3306, PE 3406, and PE 3408 materials may be joined by heat fusion.

3 Field Joining (Plastic-to-plastic and plastic-to-metal)

3. Solvent cement. (Plastic-to-plastic)

(a) The solvent cement and piping components may be conditioned prior to assembly by warming, provided that it is done in accordance with the manufacturer's recommendations. Special precautions are required when the surface temperature of the material is below 50° F or above 100° F.
(b) Square cut ends free of burrs are required for a proper socket joint. Beveling of the leading edge of the spigot end will provide for ease of insertion and better distribution of the cement.
(c) Proper fit between the pipe or tubing and the mating socket or sleeve is essential to a good joint. Before application of cement, the pipe or tubing should freely enter the fitting but should not bottom against the internal shoulder. Sound joints cannot normally be made between components which have a loose or very tight fit.
(d) A uniform coating of the solvent cement is required on both mating surfaces. A light coating should be applied to the socket and a heavier coating applied to the pipe or tubing. The pipe should immediately be inserted into the socket and bottomed in the socket.

For diameters greater than 2 inches, additional measures may be necessary to bottom the pipe. The completed joint should be held together for sufficient time to prevent the pipe from backing out of the fitting. After the joint is made, excess cement should be removed from the outside of the joint.
(e) The joint should not be subject to a pressure test until it has developed a high percentage of its ultimate strength. The time required for this to occur varies with the type of cement, humidity, and temperature.
(f) Other recommendations for making joints may be found in ASTM D 2855 (for PVC),.the Appendix of ASTM D 2235 (for ASS), and the Appendix of ASTM D 2560 (for CAS).

3.2 Heat fusion by externally applied heat. (Plastic to plastic)

(a) General training programs (which include both printed material and slides) are available from the Plastics Pipe Institute (see Appendix G-192-1) and many manufacturers of plastic pipe.
(b) Care should be used in the heating operation. The material should be sufficiently heated to produce a sound joint, but not overheated to the extent that the material is damaged.
(c) Square cut ends free of burrs are required for a proper joint.
(d) The mating surfaces shall be clean, dry, and free of material which might be detrimental to the joint.
(e) Other recommendations for making heat-fusion joints may be found in ASTM D 2657.
(f) Polyethylene piping of different compounds or grades can be heat fused. Such joining should not be undertaken indiscriminately, and should be undertaken only when qualified procedures for joining the specific compounds are used. Plastics Pipe Institute Technical Note 13, "General Guidelines for Heat Fusion of Unlike Pipes and Fittings," is suggested for reference.
(g) Rain, cold, and windy weather conditions can influence fusion quality. Modification of the recommended heating time (in the procedure) during such conditions should be given consideration.
(h) For hot taps, see the material under 192.123.
(i) The condition of equipment for heat fusing polyethylene plastic must conform, to the equipment manufacturer's

recommended tolerances for acceptable wear of 'critical components. The use of damaged or worn equipment may result in fusion joints that are weak or out of alignment. The frequency of inspection should be determined by the operator based on equipment usage, equipment age and condition, and manufacturer's recommendation.

3.3 Heat-fusion by electrofusion. (Plastic to plastic)

(a) Sections 192.273 and 192.283 require that procedures for making joints, other than by welding, be written and qualified. Each electrofusion equipment manufacturer is a source of appropriate procedures for their respective system. The operator should check State requirements on the use of electrofusion. Generally each procedure should contain some or all of the following elements:

(1) Couplings.
(i) The pipe should be cut at square angles.
(ii) The pipe should be marked with the proper stab depth for the fitting.
(iii) Using the tool specified in the qualified procedure, surface oxidation should be removed from the area of the pipe to be fused (up to the stab depth marks).
(iv) One end of the pipe should be secured in an appropriate clamping device, the fitting slid onto pipe, the second piece of pipe placed into clamp, and the fitting slid onto each pipe so it is properly aligned. Insertion up to the stab depth marks should be ensured.
(v) The control box should be tested for proper function.
(vi) The fitting should be connected to the fusion control box and the cycle activated. The fitting should be left in the clamp until cooling has been completed.
(vii) The joint should be inspected in accordance with 192.273.

(2) Sidewall fittings.
(i) Determine the pipe area where the fitting is to be fused.
(ii) All surface oxidation should be removed from the pipe in the area to be fused using the tool specified in the qualified procedure.
(iii) The fitting should be positioned and clamped in the cleaned area.
(iv) The control box should be tested for proper function.
(v) The fitting should be connected to the fusion control box and the cycle activated. The fitting should be left in the clamp until cooling has been completed.
(vi) The joint should be inspected in accordance with 192.273.

(b) The following are useful references for joining plastic pipe by electrofusion.

(1) ASTM F 1055 Standard Specification for Electrofusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene Pipe and Tubing.
(2) ASTM F 1290 Standard Practice for Electrofusion Joining of Polyethylene Pipe and Fittings.

3.4 Adhesive. (Plastic to plastic)

(a) The mating surfaces should be suitably prepared and should be dry and free of material which might be detrimental to the joint.

(b) Adhesive should be properly mixed and liberally applied on both mating surfaces. The assembled joint should be held together in alignment for sufficient time to prevent the pipe or tubing from backing out of the fitting.

(c) The assembled joint should not be disturbed until the adhesive has properly set. The joint should not be subjected to a pressure test until it has developed a high percentage of its ultimate strength. The time required for this to occur varies with the adhesive, humidity, and ambient temperature.

(d) To accelerate curing, an adhesive bonded joint may be heated in accordance with the manufacturer's recommendation.

3.5 Mechanical. (Plastic to plastic and plastic to metal)

(a) When compression type mechanical joints are used, the elastomeric gasket material in the fitting should be compatible with the plastic; that is, neither the plastic nor the elastomer should cause deterioration in chemical or mechanical properties to the other over a long period.

(b) The tubular stiffener required to reinforce the end of the pipe or tubing should extend at least under that section of the pipe compressed by the gasket or gripping material. The stiffener should be free of rough or sharp edges. Stiffeners which fit the pipe or tube too tightly or too loosely may cause defective joining.
(c) The pull-out resistance of compression type fittings varies with the type and size of the fitting and the wall thickness of the pipe being joined. Therefore, all mechanical joints should be designed and installed to effectively sustain the longitudinal pull-out forces caused by contraction of the piping and by maximum anticipated external loading. To minimize these forces, practices such as the following should be used.

(1) With direct burial, snaking the pipe in the ditch when the pipe is sufficiently flexible.
(2) With insertion in a casing, pushing the pipe into place so that it is in compression rather than tension.
(3) Allowing for the effect of thermal expansion and contraction of installed pipe due to seasonal changes in the temperature. The importance of this allowance increases with the length of the installation. This allowance may be accomplished by the following:

(i) Offsets.
(ii) Anchoring.
(iii) Strapping the joint.
(iv) Placing the pipe in slight axial compression.
(v) Expansion-contraction devices.
(vi) Fittings designed to prevent pull-out.
(vii) Combinations of the above.

This allowance is of paramount importance when the plastic pipe is used for insertion inside another pipe, because it is not restrained. Coefficients of thermal expansion for thermoplastic materials determined using ASTM D 696 are listed in Table 192.281i.

Age Limit on Polyethylene Plastic Pipe

Polyethylene Plastic Pipe manufactured two years prior to the date of intended installation should not be used for gas service, **September 7, 2009 Notification Bulletin.**

PE plastic pipe in warehouses and store rooms across the State that was manufactured long ago as to put into question its suitability for service as gas piping material. In some instances, pipe supplied from vendors was out of date when it was delivered to Operators. That pipe does not meet the standards established in CFR 49, Part 192, ASTM D-2513(99) (incorporated by reference), Annex A1.5.7 Outdoor Storage Stability. It should not be used for gas service.

There are some exceptions to this rule that may apply if pipe is less than 3 years old or the pipe has been stored inside a warehouse (or otherwise protected from ultra-violet radiation [sunlight]). Operators who have substantial quantities of PE pipe between 2 years and 3 years old should contact your Pipeline Safety Investigator for guidance or assistance in obtaining a Special Permit to use this pipe in gas service.

PE pipe that is more than 3 years old should not be used for gas service.

Note: Operators receiving Polyethylene Plastic Pipe for gas service should inspect the markings on the print line to determine the month/year of manufacture.

If this pipe is intended for use in the near future, an older date of manufacturer could be acceptable if it has not "expired", i.e., installation will occur before the 2 years has lapsed. Otherwise, inside storage is necessary to preserve the suitability of the pipe for gas service.

Operators should document inside storage of plastic pipe by noting the manufacturer's name, date of manufacture, manufacturer's lot number and the date placed in "inside storage". This information should become a part: of the construction records for that particular PE material.

118 Maintenance Records

These specifications are covered under Section 106, "Record Keeping Procedures".

119 Depth of Burial

119.2 Distribution Mains

Gas distribution mains must be installed with a **minimum of twenty-four inches (24") cover** in accordance with CFR 49/DOT 192.327. All depths specified in this standard meet or exceed the required twenty-four inches (24") minimum cover for distribution mains.

Where an underground structure prevents the installation of a distribution main with the minimum cover, the main may be installed with less cover if it is provided with additional protection to withstand anticipated external loads. For distribution mains in non-traffic areas, this additional protection may consist of a four inches (4") thick layer of concrete above the main. This protective layer should extend one (1) foot beyond both sides of the main for the entire length of the shallow installation. The intent of this concrete layer should be to protect the pipe from damage by outside forces, and should not be intended for load-bearing protection. Such installations cannot be made without prior approval of the Gas Operator. **NOTE:** Concrete shall not come in contact with steel piping, due to the corrosive nature of concrete products.

D.O.T. ACCOMMODATING UTILITIES RIGHT-OF-WAY

1680-6-1-.01 PREFACE

Utility facilities have been accommodated in highway rights-of-way pursuant to various State statutes, local laws, ordinances and franchises upon execution of a Utility Use and Occupancy Agreement issued by the Department of Transportation. Heretofore such installations have been based on Department of Transportation approval of plans, prepared by the utility, prior to execution of the Utility Use and Occupancy Agreement by the Department of Transportation.

However, construction of freeway type highways, as exemplified by the system of Interstate and Defense Highways, to accommodate large volumes of vehicular traffic and demands of population for essential utility services, has necessitated the Department of Transportation to consider the effects of joint usage of highway rights-of-way and develop written rules and regulations to govern the use and occupancy of highway rights-of-way by public and private utilities. Rules and Regulations set forth herein have been prepared with the thought of accommodating utility facilities and at the same time maintaining the integrity, operational safety and function of the highway facility.

1680-6-1-.02 DEFINITION OF TERMS:

(1) For the purpose of these rules and regulations, the following definitions shall apply:
Average Daily Traffic: The average 24 hour volume, being the total volume during a stated period divided by the number of days in that period. Unless otherwise stated, the period is a year. The term is commonly abbreviated as ADT.
Backfill: Replacement of suitable material compacted as specified around and over a pipe, conduit, casing or gallery.
Bedding: Organization of soil or other suitable material to support a pipe, conduit, casing or gallery.
Cap: Rigid structural element surmounting a pipe, conduit, casing or gallery.
Carrier: Pipe directly enclosing a transmitted fluid (liquid or gas).

Casing: A larger pipe enclosing a carrier.
Clear Zone: That roadside border area, starting at the edge of the traveled way, available for use by errant vehicles.
Coating: Material applied to or wrapped around a pipe.
Commissioner of Transportation: Commissioner of Transportation, Department of Transportation.
Conduit or duct: An enclosed tubular runway for protecting wires or cables.
Control of access: The condition where the right of owners or occupants of abutting land or other persons to access, light, air or view in connection with a highway is fully or partially controlled by public authority.
Conventional highway: An arterial highway without access control.
Cover: Depth of top of pipe, conduit, casing or gallery below grade of roadway or ditch.
Cradle: Rigid structural element below and supporting a pipe.
Department of Transportation: The Department of Transportation.
Direct burial: Installing a utility facility underground without encasement.
Division Administrator: Division Administrator, Federal Highway Administration, U. S. Department of Transportation.
Drain: Appurtenance to discharge liquid contaminants from casings.
Encasement: Structural element surround a pipe.
Encroachment: Unauthorized use of highway right-of-way or easements as for signs, fences, buildings, utilities, parking, storage, etc.
Expressway: A divided arterial highway for through traffic with full or partial control of access and generally with grade separations at major intersections.
FHPM: Federal-Aid Highway Program Manual.
Flexible pipe: A plastic, fiberglass, or metallic pipe having large ratio of diameter to wall thickness which can be deformed without undue stress.
Freeway: An expressway with full control of access.
Frontage road: A local street or road auxiliary to and located on the side of an arterial highway for service to abutting property and adjacent areas and for control of access.
Gallery: An underpass for two or more utility lines.
Gas Main: A pipe installed in a community to convey gas to individual service lines or other mains.
Grounded: Connected to earth or to some extended conducting body which serves instead of the earth, whether the connection is intentional or accidental.
Grout: A cement mortar or a slurry of fine sand or clay.
Highway, Street or Road: A general term denoting a public way for purposes of vehicular travel, including the entire area within the right-of-way.
Manhole: An opening in an underground system which workmen or others may enter for the purpose of making installations, inspections, repairs, connections and tests.
Median: The portion of a divided highway separating the traveled ways for traffic in opposite direction.
New Utility Installation: An initial installation on the highway right-of-way and the replacement of existing facilities with those of a different type, capacity or design or replacement at a new location on the right-of-way.
Normal: Crossing at a right angle.
Oblique: Crossing at an acute angle.
Partial control of access: The authority to control access is exercised to give preference to through traffic to a degree that, in addition to access connections with selected public roads, there may be some crossings at grade and some private driveway connections.
Pavement structure: The combination of subbase, base course, and surface course placed on a subgrade to support the traffic load and distribute it to the roadbed.
Pipe: A tubular product made as a production item for sale as such. Cylinders formed from plate in the course of the fabrication of auxiliary equipment are not pipe as defined here.
Pipeline or transmission line: A pipe installed for the purpose of transmitting a product from a source or sources of supply to one or more distribution centers, or to one or more large volume customers, or a pipe

installed to interconnect sources of supply.
Plowing: Direct burial of utility lines by means of a "plow" type mechanism which breaks the ground, places the utility line and closes the break in the ground in a single operation.
Pressure: Relative internal pressure in psig (pounds per square inch gauge).
Private lines: Privately owned facilities which conveyor transmit commodities outlined in the application and scope sections of these rules and regulations but are devoted exclusively to private use.
Right-of-Way: A general term denoting land, property, or interest therein, usually in a strip, acquired for or devoted to transportation purposes.
Rigid pipe: Pipe designed for diametric deflection of less than 1%.
Roadside: A general term denoting the area adjoining the outer edge of the roadway. Extensive areas between the roadways of a divided highway may also be considered roadside.
Roadway: The portion of a highway, including shoulders, for vehicular use. A divided highway has two or more roadways.
Safety rest area: A roadside area with parking facilities separated from the roadway provided for motorists to stop and rest for short periods. It may include drinking water, toilets, tables and benches, telephones, information, and other facilities for travelers.
Scenic overlook: A roadside area provided for motorists to stop their vehicles beyond the shoulder, primarily for viewing the scenery in safety.
Semi-Rigid pipe: Pipe designed to tolerate from 1% to 3% diametric deflection.
Service line: The piping installed between the meter set assembly and a main, pipeline or other source.
Slab, floating: Slab between, but not contacting, pipe or pavement.
Sleeve: Short casing through pier or abutment of highway structure.
Special Provision: Provision inserted into a Use and Occupancy Agreement revising these rules and regulations or supplements hereto, and covering conditions peculiar to the individual utility installation.
Specifications: Standard Specifications for Road and Bridge Construction, Department of Transportation.
State Transportation Engineer: Transportation Engineer, Department of Transportation.
Surety: The corporation, partnership or individual other than the utility owner, executing a bond furnished the Department of Transportation by the utility owner.
Traveled way: The portion of the roadway for the movement of vehicles, exclusive of shoulders and auxiliary lanes.
Trenched: Installed in a narrow open excavation.
Untrenched: Installed without breaking ground or pavement surface, such as by jacking or boring.
Use and Occupancy Agreement: The document by which the Department of Transportation regulates and/or gives approval of the use and occupancy of highway rights-of-way by utility facilities or private lines.
Utility owner: The public agency, cooperative, corporation, company or individual named in the Use and Occupancy Agreement and responsible for the construction, operation and maintenance of the utility facility.
Utility Service Connection: A service connection from a utility distribution or feeder line or main to the premises served.
Vent: Appurtenance to discharge gaseous contaminants from casings.
Walled: Partially encased by concrete poured along side the pipe.

1680-6-1.03 APPLICATION AND SCOPE

(1) Application

(a) Rules and Regulations set forth herein shall apply to all public, private or cooperatively owned utilities for producing, transmitting or distributing electric power, light, communications, water, gas, oil, crude products, steam, chemicals, sewage, storm drainage, irrigation structures and ditches, fire and police signal systems and street lighting systems that are to be located, adjusted and/or relocated either overhead or

underground within rights-of-way of highways which compose the state, Federal-aid metro-urban and State-aid highway system of roads. Utility owners must deal directly with county and/or city officials concerning installations or relocations on Federal-aid metro-urban and State-aid highway system roads unless advised in writing that the Department of Transportation is acting as agent for the local government in acquiring the right-of-way and adjusting utilities to accommodate proposed highway construction.
(b) It is not intended that these rules and regulations be retroactive but shall be effective on the date they are officially issued or revised by the Commissioner of Transportation. They shall apply to new installations and utility facilities relocated to accommodate highway construction.

(2) Scope

Rules and Regulations set forth herein are limited to the Department of Transportation's responsibility for preserving the integrity of the highway and its safe and efficient operation. It is not intended that these rules and regulations alter or conflict with current State statutes, local ordinances, franchises or regulations for installing and maintaining utility facilities within highway rights-of-way. Neither are they to be used as a basis for determining financial responsibility for replacing, adjusting and/or relocating utility facilities. When State statutes, local ordinances, or orders of appropriate governmental agencies require a greater degree of protection than required in these rules and regulations, such requirements take precedence over these rules and regulations.

1680-6-1-.04 GENERAL CONSIDERATIONS

(1) (a) New utility facilities being installed within highway rights-of-way will require a Use and Occupancy Agreement issued by the Department of Transportation. The Department has adopted a standard Use and Occupancy Agreement. The utility official signing the Use and Occupancy Agreement must furnish evidence acceptable to the Department that he/she is empowered to bind the corporation or municipality to the terms of the agreement. This evidence will be kept on file by the Department for reference, and it will not be necessary that same be submitted each time a permit is requested so long as the same official executes the agreement.
(b) In those instances where utility facilities are being installed in highway rights-of-way by an owner or developer of properties adjacent to the highway and the utility facilities will later become the property of a local government or utility company; particular care must be exercised to insure that obligations assumed by the developer in executing the Use and Occupancy Agreement are transferred to the subsequent owner. Both the developer and subsequent owner shall sign the agreement.
(c) Individuals or businesses installing private utility facilities will be required to execute the license. This license shall be recorded by the applicant in the appropriate County Courthouse and a copy furnished to the Department.

(2) Utility facilities presently located in public rights-of-way which must be adjusted and/or relocated to accommodate new highway construction will be subject to these stated rules and may be retained in the rights-of-way under provisions of the existing permit or Use and Occupancy Agreement. If no record of a permit can be found by either the utility or State, a Use and Occupancy Agreement will be prepared by the Department of Transportation for execution by the utility and State Transportation Engineer.

(3) The facilities of a utility located in private lands, whether owned in fee or easement, that must be adjusted and/or relocated to accommodate new highway construction and will thereafter jointly occupy said lands with the highway shall be subject to these rules.

(4) Utility facilities presently located in private lands, by virtue of adverse possession thereof, which must be adjusted and/or relocated to accommodate highway construction and will, when adjusted and/or relocated, occupy lands acquired for highway rights-of-way will be subject to these rules. A Use and Occupancy Agreement will be subject to these rules. A Use and Occupancy Agreement will be prepared by

the Department of Transportation for execution by the utility owner and the State Transportation Engineer.

(5) Execution of a Use and Occupancy Agreement will be reguired for:
(a) Routine maintenance of utility facilities where pavement and shoulders are not disturbed.
(b) Placement of additional cable in existing underground ducts.
(c) Changing of transformer in electric distribution lines.
(d) Re-conducting, re-framing and other minor work on existing poles, anchor and guy facilities when poles are not added. Poles may be replaced in the same location; however, consideration must be given to relocating the pole line in order to meet the present safety requirements as outlined in these rules and regulations.
(e) Underground water, gas, electric, telephone or other service connections when shoulder or pavement of highway is not disturbed.
(f) Overhead service connections on convention highways. Overhead service connections shall not be made across freeway projects without approval of the Department of Transportation.

1. The utility owner or authorized representative, when performing any of these activities, is required to provide signing and traffic control measures as required and set forth in these rules.
2. The utility owner must notify the Department of Transportation's Regional Utilities Engineer prior to performing excavation or replacing poles within the highway right-of-way. When work must be done on an emergency basis during other than normal working hours, notification shall be given by the next working day. If any temporary structures are required to facilitate the work, the location of these structures must be approved by the Regional Utilities Engineer.

(6) Design, location and installation of new utility facilities or necessary relocation and/or adjustment of existing utility facilities within rights-of-way of freeway highway projects shall conform to the current provisions of "A Policy on the Accommodation of Utilities Within Freeway Right-of-Way'" published by the American Association of State Highway and Transportation Officials. This publication is included herein as Appendix #2.

(7) Use and Occupancy Agreements for installation of utility facilities within rights-of-way of freeways required the approval of the Division Administrator, Federal Highway Administration, when facilities are not installed in accordance with provisions of these rules.

(8) In extreme hardship cases the Department will consider accommodation of trunkline or transmission type utility facilities within rights-of-way of freeway projects when conditions as outlined in Volume 6, Chapter 6, Section 6, Section 3, Subsection 2 of the Federal-Aid Highway Program Manual (Federal Highway Administration's PPM 30-4.1, dated November 29, 1972), applying to Application of Joint Development and Multiple Use Concepts to Freeways and Utilities can be satisfied and subject to approval of the Division Administrator, Federal Highway Administration, on Federal-aid freeway projects.

(9) The responsibility of designing, installing, maintaining, repairing and operating utility facilities to be located within highway rights-of-way under terms of an approved Use and Occupancy Agreement shall be the express obligation of the company, individual or public agency owning the facility. (Relocation costs to accommodate highway construction will be considered under the Department of Transportation's reimbursement procedures for such relocations).

(10) The Department of Transportation will inspect all utility installations within highway rights-of-way for conformity with herein stated rules and regulations and special provisions which are made a part of the Use and Occupancy Agreement. When new installations within the rights-of-way of existing highways are of such magnitude and complexity as to require extensive inspection services by the Department of Transportation to ascertain that all provisions of these rules and regulations are carried out, the Department of Transportation reserves the right to place an inspector on the site for the duration of construction

activities. The utility in accepting the Use and Occupancy Agreement agrees to reimburse the Department of Transportation for said inspector's salary, equipment use and miscellaneous expense applicable to the installation of the utility facilities. The necessity for such inspection services can usually be determined prior to execution of the Use and Occupancy Agreement, and the requirement for inspection services will be set out as a part of the agreement by incorporation of a special provision. Failure to install facilities in accordance with these rules and regulations and terms of the Use and Occupancy Agreement will result in the Department of Transportation I s Regional Engineering Director advising the utility company to suspend further construction activities until corrective measures have made to the satisfaction of the Department of Transportation.

(11) Any inspection or control exercised by the Department of Transportation shall in no way relieve the utility owner of any duty or responsibility to the general public nor shall such services and/or control by the Department of Transportation relieve the utility owner from any liability for loss, damage or injury to persons or adjacent properties.

(12) The decision of the State Transportation Engineer, and if required the Division Administrator of the Federal Highway Administration, shall be final and conclusive with respect to conditions, terms, stipulations and provisions of the Use and Occupancy Agreement as approved.

1680-6-1-.05 DESIGN

(1) Prior to commencing design of utility facilities that will encroach upon highway rights-of-way, it is recommended that utility company representatives contact the Department of Transportation's Regional Utilities Engineer and arrange for a preliminary review and, if necessary, a field inspection of the highway facility. This review will provide a basis for discussing proposed highway construction, type of highway facility involved or planned, and extent of approvals that will be required. As the State highway system is composed of many types of facilities, this is the only way design of proposed utility facilities may proceed on an orderly basis.

(2) The utility shall be responsible for the design of the utility facility to be installed within the highway right-of-way or attached to a highway structure. The Department will be responsible for review and approval of the utility's proposal with respect to the location of the utility facilities to be installed and the manner of installation or attachment. This includes the measures to be taken to preserve the safe and free flow of traffic, structural integrity of the roadway or highway structure, ease of highway maintenance, appearance of the highway, and the integrity of the utility facility.

(3) Utility installations on, over or under the rights-of-way of state highways and utility attachments to highway structures shall, as a minimum, meet the following design requirements:
(a) omitted
(b) omitted
(c) Pressure pipelines shall conform with the currently applicable sections of ANSI Standards for Pressure Piping of the American National Standards Institute including:

1. Power Piping, ANSI B31.1.0.
2. Petroleum Refinery Piping ANSI B31.3.
3. Liquid Petroleum Transportation Piping System ANSI B31.4.
4. Gas Transmission and Distribution Piping System ANSI B31.8.
5. Any pipeline carrying hazardous materials shall conform to the rules and regulations of the U. S. Department of Transportation governing the transportation of such materials.

120 EMERGENCY PROCEDURES See: Tompkinsville Emergency Procedure Manual

121 General

Since the uncontrolled and unwanted release of natural gas could result in situations hazardous to life and property, the following emergency procedures are established to bring the emergency under control in the shortest possible time and with a minimum of customer outage. In all emergency situations, the protection of life should always receive priority over the protection of property.

121.1 Definition of Emergency

As used in these procedures, the word "emergency" shall be defined as a situation in which:

1. The continued safe operation of a major segment of the gas distribution system is endangered, or
2. A gas leak (ignited or not) is of such magnitude that major roads or highways must be closed, or
3. A failure or malfunction of Tompkinsville Natural Gas System exists that:
   a. Affects a large number of customers or imposes a danger to life and health of such magnitude that mobilization of all available emergency forces is required, or
   Necessitates immediate action to prevent or lessen property damage or save lives.
4. A fire and/or explosion has occurred near, or directly involves, Tompkinsville gas system.
5. A natural disaster has occurred.

121.2 Gas Inside or Near a Building

For the specific situation of gas detected inside or near a building, see **Section 108.2, "Response to Gas Leak Reports".**

121.3 System Information

System information normally stored on system maps, service records, and valve records is made available by the Gas Operator.

121.4 Location of Equipment and Materials (See Tompkinsville Emergency Procedures)

The Tompkinsville Gas Operator properties containing equipment and materials that may be necessary in an emergency and shall be made available at all times. Location of emergency equipment and materials is the Tompkinsville Shop. Keys may be obtained at this location as well. **NOTE: Any good neighbor policy or a Mutual Assistance agreement between gas systems shall be used to cooperate and assist each other and render aid.**

121.5 Mutual Assistance Agreement (SISP) Form

SYSTEMS INTEGRITY SAFETY PROGRAM (SISP)
AGREEMENT

Between______________________________________and_______________________________________

AND U.S. DEPARTMENT OF TRANSPORTATION
PIPELINE AND HAZARDOUS MATERIALS SAFETY
ADMINISTRATION (PHMSA)

1. GENERAL STATEMENT OF PURPOSE

To cooperatively enhance quality assurance and compliance with 49 CFR Parts 107 & 171-180 (Hazardous Materials Regulations or HMR), utilizing methods alternative to the traditional enforcement approaches to achieve the goals and objectives of the SISP. These goals and objectives are to promote and enhance transportation safety by offering assistance to entities affecting the transportation of hazardous materials.

2. THE PARTIES; FACILITIES COVERED; CONTACTS

a. Company Name

i.The entities and locations to be covered by this Agreement (hereinafter "Participant") include:

Name	Address

ii. For purposes of implementing this Agreement, the principal contact is________________________________

(Should be present at all site visits.)

iii. Participant was selected for this agreement based on the following criteria:

Note: Criteria to be added in these spaces.

1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

b. PHMSA:

i. PHMSA is the U.S. Department of Transportation modal administration charged with overseeing the regulatory requirements of the Hazardous Materials Transportation Act and other related statutes and regulations. Its Headquarters is located at 1200 New Jersey Ave, SE, Washington, DC 20590.

ii. The PHMSA representative office that will oversee implementation of this Agreement is located at:

Kentucky Public Service Commission
P. O. Box 615
Frankfort, Kentucky 40602
(502)564-3940, ext: 416, Fax (502)564-1582

iii. The SISP Regional Coordinator, will serve as the primary PHMSA point of contact.

iv. PHMSA is the governmental party to this Agreement. This Agreement only binds PHMSA and is not binding on the Federal Aviation Administration, the Federal Motor Carrier Safety Administration, the Federal Railroad Administration or any other governmental entity.

3. SCOPE OF AGREEMENT

a. PHMSA and Participant will cooperatively develop a Systems Integrity Safety Program Plan (hereinafter "the Plan") which will specify the actions to be taken by each party and will facilitate the exchange of information.

b. The Plan will include, at a minimum, the following elements:

. Data analysis
. Site visits to selected locations
. Review and evaluation of processes and procedures
. Review of pertinent documentation
. Interviews with selected personnel
. Identification of potential deficiencies
. Recommendations

c. In order to facilitate flexibility, the Plan will consist of multiple phases. The terms of each phase will be incorporated into a written document, a Phase Plan. Each Phase Plan may be amended subject to agreement by both parties. In addition, Phases 1 and 2 may be repeated in an iterative process, as needed.

d. Participant agrees to disclosure and production of its data, processes, systems and operations as necessary to facilitate a complete and accurate assessment of Participant's hazmat shipping operations. Proprietary, confidential, and competitive sensitive data and documents either will be made available for review but not released to PHMSA or will be released to PHMSA under the provisions of 49 CFR § 105.30, at Participant's discretion. NOTE: Operator Qualification Program personnel information can be either exchanged by all parties concerned or managed by a designated independent council.

4. TIMETABLE

a. Phase 1 - Data Analysis

Participant must provide required information no later than 30 days following acceptance of this Agreement by both parties. The completion date for Phase 1 will be no later than 60 days following receipt of the required

PHMSA and Participant will develop a Phase 2 Plan as outlined here. After acceptance by both parties, the Phase 2 Plan will be appended to this agreement. The Phase 2 Plan will specify each location selected for a site visit. The site(s) will be selected based on the results of Phase 1 and any other relevant information available to PHMSA. Site visits will be scheduled at a reasonable and mutually acceptable date and time for both parties. In most cases, site visits will be scheduled in conjunction with Participant's primary representative, named in Section 2.a.iii.

Site visits will provide the opportunity for Participant and PHMSA to observe jointly the current I operations and any improvements resulting from prior site visits. The person named in Section 2.b.iii will be the primary PHMSA representative participating in these visit(s). In addition to the review of processes and procedures, site visits will include interviews with appropriate personnel and pertinent data/information collection.

Participant agrees to make appropriate personnel available for interview. At the end of each site visit, PHMSA will provide a list of apparent non-compliances identified, if any. The Phase 2 Plan will include deadlines (usually 10 days) for Participant to provide initial corrective action for any apparent non-compliance identified by PHMSA. Corrective actions must be implemented at all entities/facilities identified in Section 2.a.ii.

During or as a result of a site visit, PHMSA may offer suggestions to improve safety beyond the level provided by compliance with the hazardous materials transportation regulations. Participant is under no obligation to accept any or all of these suggestions.

Phase 3 Plan

PHMSA will prepare a Final Recommendation Report. The Final Recommendation Report will describe any probable violations identified and Participant's corrective actions. In addition, PHMSA may provide recommendations regarding actions Participant may wish to take to enhance safety beyond the level required by regulation. Participant agrees to provide a response to each recommendation (agree to implement, will continue to consider, will not implement) no later than the termination date of this Agreement. Participant will complete a survey providing feedback regarding its experience in the SISP.

The parties will hold at least one final meeting to debrief and to discuss the Final Recommendation Report, including additional comments for improvement or compliance program effectiveness. This meeting will be held approximately two (2) weeks prior to the expiration of this Agreement and will include participants as mutually agreed by both parties.

6. CONFERENCES AND MEETINGS

In addition to any interaction provided for elsewhere in this Agreement, the parties anticipate they will hold conferences or meetings during the term of this Agreement to discuss implementation of this Agreement. Participants in and locations for the meetings will be as mutually agreed by the parties.

PHMSA and Participant will develop a Phase 2 Plan as outlined here. After acceptance by both parties, the Phase 2 Plan will be appended to this agreement. The Phase 2 Plan will specify each location selected for a site visit. The site(s) will be selected based on the results of Phase 1 and any other relevant information available to PHMSA. Site visits will be scheduled at a reasonable and mutually acceptable date and time for both parties. In most cases, site visits will be scheduled in conjunction with Participant's primary representative, named in Section 2.a.iii.

Site visits will provide the opportunity for Participant and PHMSA to observe jointly the current I operations and any improvements resulting from prior site visits. The person named in Section 2.b.iii will be the primary PHMSA representative participating in these visit(s). In addition to the review of processes and procedures, site visits will include interviews with appropriate personnel and pertinent data/information collection.

6. CONFERENCES AND MEETINGS

In addition to any interaction provided for elsewhere in this Agreement, the parties anticipate they will hold conferences or meetings during the term of this Agreement to discuss implementation of this Agreement. Participants in and locations for the meetings will be as mutually agreed by the parties.

7. NO ENFORCEMENT ACTIONS

a. During the term of this Agreement, PHMSA agrees that it will suspend all routine inspection activities involving sites identified in Section 2.a.ii.

b. PHMSA will not issue, take or initiate any type of enforcement action against Participant based upon or related to observations or evidence collected at such sites during the term of this Agreement, unless this Agreement is terminated due to a breach.

c. Notwithstanding Section 7.b. above, PHMSA reserves its right to issue, take or initiate enforcement action against Participant for violations of the HMR that PHMSA believes to be willful.

d. Notwithstanding Section 7.b. above, PHMSA reserves its right to issue, take or initiate enforcement action in instances where a safety violation presents an imminent hazard.

e. No Waiver of Pending Enforcement Actions. Pending enforcement actions or penalty assessments against Participant as of the effective date of this Agreement will not be dismissed.

8. CONFIDENTIALITY AND PUBLICITY

a. For documents in the possession of PHMSA, Participant must adhere to 49 CFR §105.30 in order to claim confidential treatment for any information it submits pursuant to this agreement.

b. Upon mutual agreement of the parties, certain details about Participant's participation in this Agreement may be publicized.

9. NO ADMISSION AND COMPLIANCE WITH LAW

a. The existence of this Agreement or Participant's participation in this Agreement is not an express or implied admission of any fault or violation of law or regulation by Participant, its parent, affiliates, or subsidiaries and their respective directors, officers, employees, or agents.

b. PHMSA is exercising its enforcement discretion by agreeing to refrain nom initiating civil penalty procedures against the participant for probable violations identified during the term of this Agreement.

c. Participant understands that, while this Agreement provides that PHMSA will suspend inspection and enforcement for the term of this Agreement, Participant has a continuing obligation to comply with laws and regulations applicable to its facilities and sites. If Participant discovers or has questions about compliance with the HMR during the term of this Agreement, Participant may bring such findings to PHMSA for discussion concerning compliance
improvements and will not be subject to enforcement actions by PHMSA.

d. Participant agrees to continue to exercise good faith in complying with all laws and regulations during the term of this Agreement. Represents that it has full authority to execute the Agreement on behalf of the party.

10. MISCELLANEOUS

a. Authority to Execute Agreement. Each of the persons executing this Agreement on behalf of the parties represents that it has full authority to execute the Agreement on behalf of the party.

b. Amendments. No addition, amendment or variation of this Agreement shall be binding unless reduced to writing and signed by a duly authorized representative of each party.

c. Each party will be responsible for its own costs in implementing this Agreement.

11. TERM OF AGREEMENT

a. The effective date of this Agreement is ______________________________.

b. The term of this Agreement will be_____________________ months from the effective date of this Agreement.

c. Either party may terminate this Agreement upon 30 days advance, written notice to the other party without penalty.

d. The term of this Agreement may be extended upon agreement of both parties and the execution of an addendum.

e. PHMSA may terminate without prior notice upon breach of any provision of this Agreement.

The parties have caused this Agreement to be executed by their duly authorized representatives as of the effective date indicated above.

By:____

Title:____

Date:____

U.S. DEPARTMENT OF TRANSPORTATION PIPELINE AND HAZAROUS MATERIALS SAFETY ADMINISTRATION

By:____

Title:____

Date:____

122.14 The Gas Operator shall adjust pressures, shift loads, curtail customers and take other action deemed necessary to protect customers, the system and minimize outages.

122.15 The Gas Operator shall maintain communications with the pipeline company and keep updated reports until the emergency is cleared.

122.2 Tompkinsville Gate and District Regulator Station Facilities

122.21 The first Tompkinsville representative to have knowledge of an emergency at a gate or district regulator station shall report the situation to the Gas Operator. If the Gas Operator is the first to be notified, the information shall be relayed to responding personnel in the field. **See 101 Pressure Limitations; for a detailed description of the Tompkinsville Regulator Stations**

122.22 When adequate information is available to determine that an emergency does exist, the Gas Operator shall execute the Emergency Call List.

122.23 The highest ranking responsible person affected by the emergency situation shall take charge upon arriving on the scene.

122.231 The person in charge will coordinate activities and issue instructions necessary to bring the emergency under control. Main line valves will be closed only upon clearance from the Gas Operator, except where, in the opinion of the person in charge, the emergency is so severe that immediate shut down is imperative, in which case he/she may issue shut down instructions without such clearance. If he does so, he shall notify the Gas Operator at the earliest practical moment.

122.24 The Gas Operator shall adjust pressure, shift loads, curtail customers and take other action deemed necessary to protect customers, the system and to minimize outages.

122.25 The on-site representative shall keep the Gas Operator informed of current status, take pressure and/or flow readings as needed, and advise when the emergency is under control.

122.251 Designated fire, police, and other public officials shall be kept abreast of current leakage and emergency procedures.

122.26 When the emergency is under control, the Gas Operator resumes normal operation and releases responding crews as conditions permit.

122.27 The Manager of the Gas Utility or the Gas Distribution Administrator or the next responsible person shall notify the DOT and KPSC, when necessary, in accordance with federal and state regulations (see Appendix I &II).

123 General

124 Distribution System Failure or Emergency

124.1 Mains and Services

124.11 The first Tompkinsville representative to have knowledge of an emergency shall notify the Gas Operator. The Gas Operator shall then dispatch a customer service representative to verify the emergency, determine the extent and type of emergency, and give assistance as needed.

124.12 Emergency being confirmed, the Gas Operator shall signal the responsible personnel in order of authority until one has been reached. If an emergency occurs during off-duty hours, the crew on duty shall be notified prior to the above sequence.

124.13 The person contacted above shall instruct the Gas Operator as to which crew(s) to dispatch to the scene. The Gas Operator shall follow through and execute the **Emergency Call List.**

124.14 The Gas Operator representative will take charge upon arriving on the scene.

124.141 The person in charge will coordinate activities and issue instructions necessary to bring the emergency under control. The primary objective will be the protection of life first, injury and then property. This shall include the following:

1. **Evacuate and secure the area. Enlist police assistance as needed.**
2. **Request assistance of all Gas employees as needed.**

3. **Advise the Gas Operator of repairs to be made without shut down.**
4. **If mains must be shut down, request clearances to operate valves from the Gas Operator. When issuing clearances in an emergency, the Gas Operator shall operate the system with a minimum of outage. If in the opinion of the person in charge the emergency is so severe that immediate shut down is imperative, he/she may do so without clearance, but if he/she does so, he/she shall notify the Gas Operator at the earliest practical moment.**

NOTE: Only properly authorized Tompkinsville personnel shall operate gas system valves. <u>Fire or police officials, or other outside individuals, are not authorized to operate valves or instruct others (including Tompkinsville Gas personnel) to operate valves.</u>

5. **Upon terminating the supply of gas to an area, each individual service must be shut off either at the meter or the service valve (if one exists).**
6. **Proceed as necessary in accordance with any requirements of 108.22 that may be appropriate.**
7. **The gas supply to the affected area shall not be restored until it is verified that each individual service remains shut off. This shall entail a house-to-house investigation.**
8. **Upon restoring service, all piping and meters shall be purged of air and appliances relit. In the event a customer is not at home when service is to be restored, a notification card shall be left in a conspicuous location requesting that he/she call the Gas Operator to arrange for restoration of service.**

124.142 The person in charge shall keep the Gas Operator informed as to status of the emergency and advise when the emergency has been brought under control.

124.143 Appropriate fire, police, and other public officials shall be kept current concerning leakage and emergency procedures.

124.15 The Gas Operator shall adjust pressures and flows as deemed appropriate to protect customers, and to keep the affected area to a minimum outage.

124.16 When the emergency is under control, the Gas Operator shall resume normal operation and release crews.

124.161 The person in charge decides when a main can be returned to service. He or she then requests clearance from the Gas Operator and, upon receipt of clearance, reinstates service according to all applicable procedures.

124.162 The person in charge will notify the Gas Operator when services can be restored and provide the number of interrupted services.

124.17 The Gas Distribution Administrator or the next responsible person shall notify DOT and KPSC, when necessary, in accordance with applicable federal and state regulations.

124.18 The Gas Operator representative in charge of customer service shall coordinate the restoration process when more than ten (10) customers are involved.

124.19 An investigation shall be conducted and report made in accordance with section 126.

124.2 Gas Outage/Low Pressure Notification Procedure

The purpose of this section of these procedures is to ensure that gas service restoration is done in a safe manner. Particularly, that gas service is not restored until all interrupted services have been shut off at the meter in accordance with the above procedures. This will also ensure that any area experiencing low pressure can receive proper attention to avoid continuing problems. **Some of these situations may require invoking the Emergency Call Lists, and/or may be reportable to the KPSC or DOT as covered in the above sections.** This procedure is intended to facilitate such reporting when required.

124.21 Whenever a gas outage or low pressure call is received involving two (2) or more services in the same general area, the Gas Operator will notify the Gas Distribution Supervisor.

124.22 Whenever a gas outage or low pressure involves ten (10) or more services in the same general area, or is otherwise unusual, the Gas Operator shall notify the Gas Distribution Administrator or the next administrator.

125 Other Mission Responsibilities

125.1 Fire Department

125.11 In case of fire or explosion, the first responsible person on the scene shall have the Gas Operator notify the appropriate Fire Department serving the area in which the emergency occurs.
125.12 Current phone numbers of each Fire Department and the area served shall be made readily available to all parties concerned. Phone numbers and maps shall be provided depicting area Fire Department Stations.

125.2 Police Department

125.21 When considered necessary for evacuation and/or security purposes, the first responsible person on the scene shall have the Gas Operator notify the appropriate law enforcement agency serving the area in which the emergency occurs.

125.22 Current phone numbers of each law enforcement agency and the area served shall be made readily available to all parties concerned.

125.3 Administrator of Customer Service (Restoration)

125.31 Personnel responsible for restoration of gas services shall be kept apprized of the situation and the availability of appropriate representatives for restoration of services.

125.4 Safety Response

125.41 Administers first-aid to injured person(s) to the extent of their ability.

125.42 Assists and advises in any manner directed by the person in charge.

125.43 Schedules meeting of the investigative team as provided for in section 126, "Gas Investigation Committee".

125.5 Claims Research

125.51 Gathers information on damages, injuries and claims resulting from an emergency.

125.6 Legal Response

125.61 Submit to the Gas Manager a report of costs and legal liabilities.

125.7 The Gas Operator or representative/Mayors office shall prepare news releases as appropriate.

125.71 Acknowledges individuals and/or agencies involved in responding to the emergency.

NOTE: All media inquiries or requests for news releases concerning the emergency will be referred to the Gas

Operator, representative and the Mayor's office.

125.8 Emergency Management Agency/Red Cross

The appropriate Emergency Management Agency authorities may be notified if, in the judgement of the Gas Operator, the emergency is serious enough to warrant Emergency Management Agency assistance.

126 Gas Investigative Committee

Following an emergency that is reportable to DOT and KPSC, or that is otherwise consequential, an investigative team consisting of the Gas Operator and administrators of the Gas Distribution system, as involved, shall conduct an investigation and submit to the appropriate authority a final report concerning the following:

1. **Cause of emergency**
2. **Extent of damages and injuries**
3. **Recommended action to prevent a similar occurrence**

NOTE: The committee shall be assigned by the Gas Operator or representative(s) involved in the investigation of the incident/accident. The committee members shall be assigned to the committee after the incident/accident.

127 Employee Training/Emergency Procedures Training

127.1 **An employee meeting shall be scheduled at least once each calendar year for the purpose of discussing and training of employees in emergency procedures as well as trained on the use of the O&M.**

127.2 **The employee training and discussions shall include the following: Also see Review of Abnormal Operating Conditions Section 133.**

1. **Review of emergency procedures.**
2. **Review of location and use of emergency equipment.**
3. **Review of location and use of system maps, service and valve records, etc.**
4. **Review of actions, step by step, to be taken in a hypothetical emergency situation.**

127.3 **Records of attendance at each meeting shall be kept on file.**

128 Public Education/Communications

128.1 There shall be a continuing education program to enable customers, the public, appropriate government agencies, and persons engaged in excavation activities to recognize a gas emergency for the purpose of reporting it to Tompkinsville Gas Operator. CFR 49, 192.616

128.2 The following is a minimal list of information to be supplied:

1. **Information about gas.**
2. **Recognition of gas odor.**
3. **What to do and what not to do when a strong gas odor is detected.**
4. **Necessity of notifying the Gas Operator prior to excavating or performing excavation-related activities. (Kentucky One-Call System, Inc.)**
5. **Telephone number to call for information or to report an emergency.**

128.3 Information may be conveyed to the public by radio, television, newspaper, meetings, public talks, bill stuffers, mailings, and/or handouts.

128.4 A record of the public education program and related activities shall be maintained by the Manager of the Gas System/Gas Operator.

129 Damage Prevention

129.1 Tompkinsville is a member of the Kentucky One-Call System/ (811.) Anyone considering underground construction is to be encouraged to call for underground utility location at least two (2) working days prior to digging.

129.2 Tompkinsville Gas Operator shall maintain a continuously updated, list of all persons requesting underground utility location in its service area.

129.3 Tompkinsville Gas Operator shall raise public awareness of the one call system through an option of newspaper, radio and television advertisements, postings at public/government buildings and or bill stuffers.

129.4 Underground construction contractors will be routinely reminded of the one call system at pre-construction meetings and in their dealings with Tompkinsville Gas Operator distribution personnel.

129.5 All requests for facility locations, including those generated within Tompkinsville Gas Operator shall be directed to the Kentucky One Call System to ensure consistency in service and record keeping. Parties requesting locations may contact the Tompkinsville Gas Operator to check the status of their request.

129.6 Kentucky One Call System tells the locate requestor which utility companies will be notified and suggests that if there are any other known utilities in the area, those companies should be contacted directly. Kentucky One Call System further informs the caller of the date the locate is to be completed and assigns the requesting caller a number which can be used to verify the request and check the status of location work.

129.7 Gas piping locations are to be indicated by yellow paint and or approved flags marked "Gas". Any offset used in marking to preserve the markings shall be duly noted on the ground or stake. Water and underground electric lines are to be similarly marked using blue and red.

129.8 If there is reason to believe proposed underground construction will damage the pipeline, the locator is to notify the operator or appropriate gas personnel in which the work is proposed. A gas distribution representative will contact and coordinate with the excavator to ensure the integrity of the pipeline through adequate inspection of work.

129.9 A team of utility companies, excavators, locators, contractors, etc. have for the purpose of damage prevention and improving communications between all members of the excavating community. This is done to provide a forum of concerned professionals to have a joint effort in developing a plan to protect life and property for the people of Kentucky.

130 Liaison with Public Officials

130.1 Liaison shall be maintained with the appropriate fire and police organizations and the Emergency Management Agency with respect to gas emergency procedures. The purpose of such liaison shall be to acquaint the appropriate governmental agencies with Tompkinsville's ability to respond to a gas system emergency and to discuss the responsibilities of each agency that may respond to a gas emergency.

130.2 Gas emergency training sessions, emphasizing proper procedures to follow in a gas emergency, may be scheduled with fire and police organizations or performed in Safety Meeting sessions as required.

130.3 Liaison with the Emergency Management Agency will be coordinated by the Gas Operator as part of the **"Tompkinsville Emergency Response Plan."**

130.4 Liaison with local fire and police agencies will be coordinated by the Gas Operator.

130.5 Records of meetings or training sessions held with governmental agencies for the purpose of gas emergency response shall be kept on file addressing safety related training.

TOMPKINSVILLE EMERGENCY CALL LIST				
NAME	TITLE	HOME	OFFICE	MOBILE
Harold Frazier	Operator/Manager	270-487-5613	270-487-6776	270-407-8212
Ricky Birge	Utility Personnel		270-487-6776	270-427-8272
Jackie Adams	Utility Personnel		270-487-6776	270-427-6605
Tompkinsville Police			270-487-6191/911	
Tompkinsville Fire			270-487-6221/911	
Monroe County Sheriff			270-487-6622	
Monroe County Fire			270-487-9431	
Mudlick Fire			270-427-3456	
Ky State Police/Columbia		1-800-222-5555 * 270-384-4796		
Monroe Cty Ambulance			270-487-8757	
Monroe Medical			270-487-9231	
Texas Eastern/Duke			606-365-2117	
Randy Dean			606-365-2117	859-516-8192
Tim Gagle			270-427-4282	270-576-7449

TOMPKINSVILLE DAYTIME EMERGENCY PHONE NUMBERS 7:30AM-4:30PM	
270-487-6776	911
AFTER HOURS 4:30PM-7:30AM, WEEKENDS AND HOLIDAYS EMERGENCY PHONE NUMBER	
270-487-6776	911

NOTE: IF ANY SITUATION HAS BEEN DEEMED SERIOUS ENOUGH TO WARRANT A RESPONSE, PLEASE NOTIFY THE PERSONNEL HIGHLIGHTED IN "BLUE".

CITY OF TOMPKINSVILLE SUPPLIERS/CONTRACTORS/VENDORS CALL LIST				
NAME	TITLE	HOME	OFFICE	MOBILE
Danny Spencer	Consultant			9901-634-5226

KENTUCKY PUBLIC SERVICE COMMISSION (502) 564-3940

In the event of an accident or emergency that may possibly relate to natural gas, hazardous liquid or propane as its origin, the following action is required:

Telephonic notice at the earliest possible moment (not to exceed two hours) following discovery of:

1. Death or Personal Injury
2. Gas Igniting Unintentionally
3. Damage to Property ($25,000 or more)
4. Unscheduled Outage for 40 or More Customers for 4 or More Hours
5. Any Other Significant Occurrence (Newsworthy)

Reference:

807 KAR 5:006, Section 26
807 KAR 5:022, Section 13(16)(a)
807 KAR 5:027, Section 3(1)(a),(b),(c),(d),(f),(g)
807 KAR 5:027, Section 4
49 CFR Part 191.5

This reporting does not relieve you of your responsibility of reporting to the U.S. Department of Transportation (DOT) in accordance with 49 CFR Part 191.5. During office hours (8 a.m. to 4:30 p.m.), please call Mr. Jason Brangers at (502) 564-3940, ext. 416. If Mr. Brangers is unavailable, you will be transferred to other staff who will take the information concerning the incident. At any other time, please call one of the following:

NAME	POSITION	PHONE
William (Bill) Aitken	**Senior Utility Investigator**	**(502) 749-6805**
Melissa Holbrook	**Utility Investigator**	**(606) 743-4602**
Steve Samples	**Utility Investigator**	**(502) 223-3245**
Joel Grugin	**Utility Investigator**	**(502) 484-2160**
Jason Brangers	**Gas Branch Manager**	**(502) 633-5268**
Kimra H. Cole	**Director of Engineering**	**(502) 694-3940**

Notification to the Commission's voice mailbox or FAX number will not be considered proper notification.
In time of emergency, notice to the Kentucky Emergency Management - Emergency Operations Center at 1-800-255-2587 or (502) 564-7815 will result in the notification of all other emergency response personnel.
Recurring events and further investigation will dictate additional telephonic reporting. Follow-up written notification to the Commission is to be submitted within 30 days.

Jason Brangers, Manager
Gas Pipeline Safety Branch, Division of Engineering
Public Service Commission
P. O. Box 615
Frankfort, Kentucky 40602
(502)564-3940, ext: 416, Fax (502)564-1582

Abnormal conditions may include the following:

1. Operating pressures on a segment of Supplier pipeline above the maximum operating pressure but less than that required to fully activate relief valves or pressure limiting regulators.

Response: Personnel discovering an abnormally high operating pressure shall immediately notify the Gas System Operator by phone or radio. After confirmation of the abnormal condition, the Gas System Operator shall take appropriate action. Action may include, but shall not be limited to:

a. Dispatching the appropriate Gas crew(s) to investigate, verify, and take appropriate action as necessary to restore normal operations. The crew shall remain on site until released by the Gas Systems Operator.
b. Notifying appropriate supervision.
c. Notifying the pipeline supplier as to the abnormal condition.(Emergency Call List)

NOTE: IN NO CASE SHALL FIELD PERSONNEL OPERATE VALVES OR ADJUST EQUIPMENT SETTINGS WITHOUT AUTHORIZATION FROM THE GAS SYSTEMS OPERATOR.

2. Operating pressures on a segment of Supplier pipeline below the normal operating limits as established by the Gas Systems Operator. Lower operating pressure limits are based on load and seasonal conditions. **NOTE:** Seasonal raises shall not be viewed as system uprating.

Response: Personnel discovering an abnormally low operating pressure shall immediately notify the Gas Systems Operator. After confirmation of the abnormal condition, the Gas Systems Operator shall take appropriate action. Action may include, but shall not be limited to:

a. Dispatching the appropriate Gas crew(s) to investigate, verify, and take appropriate action as necessary to restore normal operations. The crew(s) shall remain on site until released by the Gas Systems Operator.
b. Notifying appropriate supervision.
c. Notifying the pipeline supplier as to the abnormal condition. (Emergency Call List)

NOTE: IN NO CASE SHALL FIELD PERSONNEL OPERATE VALVES OR ADJUST EQUIPMENT SETTINGS WITHOUT AUTHORIZATION FROM THE GAS SYSTEMS OPERATOR.

3. Supplier Line Safety Relief Valve Blowing.

Response: Field personnel discovering a relief valve on any supplier pipeline that is blowing gas shall immediately notify the Gas System Operator by phone or radio. Regardless of the source of the report, the Gas System Operator shall investigate the information available in an attempt to determine the cause of the over-pressure condition whether by telemetering or pressure recording gauges. The Gas Systems Operator shall take appropriate action. Action may include, but shall not be limited to:

a. Dispatching the appropriate Gas crew(s) to investigate the cause of the discharge and taking appropriate action to restore the system to normal operating conditions. The crew(s) shall remain on site until released by the Gas Systems Operator.
b. Notifying the Gas Operator in charge that odorized gas is being discharged into the atmosphere.
c. Notifying the Gas Controller of the pipeline supplier.
d. Notifying the appropriate supervision.

If the shutdown of a segment of a Supplier pipeline or station is required in order to make equipment repairs, the Gas Systems Operator shall coordinate and direct all such activity.

NOTE: IN NO CASE SHALL FIELD PERSONNEL OPERATE VALVES OR ADJUST EQUIPMENT SETTINGS WITHOUT AUTHORIZATION FROM THE GAS SYSTEMS OPERATOR.

4. Loss of SCADA communications with a gate station, odorizer, remotely-controlled valve, data check point, pressure control device, or a flow control device.

Response: The Gas Systems Operator shall review available telemetry information such as pressures, flows, and equipment status to determine a loss of communication condition if available. Loss of SCADA communication having been confirmed, the Gas System Operator shall take appropriate action. Action may include, but shall not be limited to:

a. Notifying appropriate personnel in involved in data communication such as:
   1. SCADA Technicians (software and/or hardware)
   2. Gas Operations personnel
   3. Electric Operations personnel
   4. Contract services

NOTE: If the communication link is not critical to the operation of the Supplier system, this notification is generally made during normal business hours.

b. Advising the Gas Controller of the pipeline supplier as judged necessary.

When the abnormal condition is reported repaired by all departments involved, the Gas Systems Operator shall verify a return to normal conditions by phone or radio.

5. Unintentional operation of a Supplier pipeline valve by field personnel.

Response: Immediately after the discovery of the unintentional operation of any supplier pipeline valve, field personnel shall notify the Gas Systems Operator by phone or radio and stand by to receive instructions. The Gas Systems Operator shall take appropriate action. Action may include, but shall not be limited to:

a. Verifying with the reporting field personnel the valve by exact location, size, type, and current position of the valve **(i.e., fully open, fully closed, or partially closed.)**
b. Dispatching appropriate Gas crew(s).
c. Advising the Gas Controller of the affected pipeline supplier(s).
d. Notifying appropriate supervision.

The Gas Systems Operator shall determine the impact of the valve operation on the Supplier system based on the full scope of the information available. The return to normal operations shall be under the direction of the Gas System Operator.

NOTE: **IN NO CASE SHALL FIELD PERSONNEL OPERATE VALVES OR ADJUST EQUIPMENT SETTINGS WITHOUT AUTHORIZATION FROM THE GAS SYSTEMS OPERATOR.**

6. Unintentional operation of a Supplier pipeline valve as a result of equipment failure or malfunction.

Response: Immediately after the discovery of the unintentional operation of any supplier pipeline valve, the Gas Systems Operator shall take appropriate action. Action may include, but shall not be limited to:

a. Dispatching appropriate gas crew(s).
b. Advising the Gas Controller of the affected pipeline supplier(s).
c. Notifying appropriate supervision.

The Gas Systems Operator shall determine the impact of the valve operation on the Supplier system based on the full scope of the information available. The return to normal operations shall be under the direction of the Gas Systems Operator.

NOTE: **IN NO CASE SHALL FIELD PERSONNEL OPERATE VALVES OR ADJUST EQUIPMENT SETTINGS WITHOUT AUTHORIZATION FROM THE GAS SYSTEMS OPERATOR.**

133 Review of Abnormal Operating Conditions

In all cases of abnormal pipeline operations, a documented review of the cause(s), steps taken, and management orders to prevent a reoccurrence shall be conducted. This review shall be initiated by the Manager/Gas Operator, except in cases of temporary loss of communication. The review shall include knowledgeable representatives of all areas involved in the design, construction, maintenance, and operation of the pipelines and facilities.

All affected gas personnel shall be thoroughly trained in the recognition, handling, and prevention of abnormal pipeline operations. This training shall be conducted as part of the emergency procedure training as outlined in Section 127, "Employee Training."

134 SYSTEM UPRATING PROCEDURES

135 General

135.1 Maximum Allowable Operating Pressure /MAOP

135.11 Unless the requirements set forth in this section have been met, no segment of the gas system may be operated at a pressure greater than the previously established maximum allowable operating pressure.
135.12 In no case shall the maximum allowable operating pressure of a system be raised to a value higher than that permitted in 49 CFR, Part 192 for a new line constructed of the same materials and in the same class location.

135.2 Bare Steel Systems

No attempt shall be made to uprate a bare steel system to a pressure that would exceed its present maximum allowable operating pressure.

135.3 System Isolation

The system in which the pressure is to be increased shall be isolated from any adjacent system that will continue to be operated at a lower pressure. Separation valves shall not be permitted unless an additional safety device is used to prevent accidental overpressuring. (Regulators, relief valves and or securities.)

135.4 Records

Records of investigations, work performed, and pressure tests conducted in connection with uprating a segment of the gas system shall be retained by the Gas Operator for the life of the segment.

137 Uprating Steel and Plastic Distribution Systems

137.1 General

This section details the steps necessary for uprating steel and plastic distribution systems.

137.2 Design Criteria

The Gas Operator shall determine the consequences of uprating a segment of a steel or plastic distribution system, taking into consideration the following:

137.21 The condition of the system to be uprated shall be determined by examination of historical documents, maintenance records, field checks, leakage surveys, and original design criteria (if available). Any material, valves or fittings not capable of withstanding the proposed maximum allowable operating pressure shall be either removed or replaced prior to uprating the system.

137.22 If maintenance records indicate a history of considerable leakage, or if more than one (1) year has passed since the last leak survey, a new leak survey shall be conducted. The results of the survey shall be analyzed to determine appropriate action to be taken.

137.23 The proposed maximum allowable operating pressure shall be consistent with the condition of the segment to be uprated and with applicable requirements of 49 CFR, Part 192.

137.24 The test pressure and duration of the test shall be determined in accordance with requirements of the CFR, 49, and shall be specified on the uprating plans.

137.25 Any modifications to customers' metering facilities by the proposed uprating shall be so designed to take place jointly with the uprating plan, giving special consideration to pressure regulation to the customer.

a. When uprating a standard pressure system, service regulators shall be proposed for installation on all service lines upstream of the meter.
b. When uprating intermediate and medium pressure systems, existing service regulators and/or other pressure limiting devices shall be examined for maximum allowable working pressure and proper orifice size, and replacements proposed for installation as required.

Customers receiving line pressure delivery shall be contacted to determine a mutually agreeable delivery pressure, and if any regulation or limiting devices need to be install as uprating procedures are implemented.

c. All pressure regulators and other pressure limiting devices to be utilized on service lines and meter centers on a high pressure system shall meet the requirements of 49 CFR, Part 192.197(c), "Control of the Pressure of Gas Delivered from High -Pressure Distribution Systems".

137.3 Application Procedures

The Manager of the Gas Operator, and all affected administrators shall see that the appropriate personnel are instructed in the proper application of the uprating procedures.

137.31 The uprating process shall be conducted in a systematic manner to insure adequate safety of all concerned, and to provide a minimum of outage for the customers.

137.32 All leaks discovered either before or during the uprating process shall be repaired or the leaking segment replaced, before further pressure increases are permitted. In addition, any repairs, replacements, or alterations in the segment to be uprated that are necessary for safe operation at the increased pressure shall be made prior to beginning the uprating process.

137.33 All offsets, bends, or dead ends in pipe joined by compression couplings shall be reinforced or anchored (strapped), if exposed in an excavation.

137.34 A service regulator and or other pressure limiting devices shall be installed on each service line in accordance with 137.25, "Design Criteria" and tested to insure proper functioning of the device.

137.35 Each segment to be uprated shall be tested in accordance with the predetermined test pressure. Pressure increases shall be incremental, and shall not exceed ten (10) psig per increase or 25% of the total pressure increase, whichever produces the fewer number of increments. **There must be at least two equal incremental increases.** The rate of each increase shall be gradual.

137.36 After each pressure increase, allowing adequate time for the system to stabilize, a leakage survey shall be conducted and each detected leak repaired before further increases are permitted.

NOTE: **If an increase in pressure can not be leak surveyed in the same working day, then the pressure shall be lowered back to the previous pressure last surveyed.**

138 Customer Owned Buried Fuel Lines

Tompkinsville Gas Operator does not maintain customer owned, buried service piping. Therefore, Tompkinsville Gas Operator must notify affected customers once, in writing, of the following information:

(1) Tompkinsville Gas Operator does not maintain the customer's piping.
(2) If the customer's buried piping is not maintained, it may be subjected to the potential hazards of corrosion and leakage.
(3) Buried gas piping should be:
    (a) Periodically inspected for leaks
    (b) Periodically inspected for corrosion if the piping is metallic; and
    (c) Repaired if any unsafe condition is discovered.
(4) When excavating near buried gas piping, the piping should be located in advance, and excavation done by hand.
(5) Plumbers and heating contractors may locate, inspect, and repair the customer's buried piping.

Such notification shall be made no later than August 14, 1996 or ninety (90) days after the customer first receives gas at a location where such piping has been identified.

Tompkinsville Gas Operator must make the following records available for inspection to the Kentucky Public Service Commission, a copy of the notice currently in use; and evidence that notices have been sent to customers within the previous three (3) years.

139 Excess Flow Valve

Excess flow valve installations shall be recorded as pipeline history and shall be maintained for the life time of the pipeline facility. The qualifying service shall operate continuously throughout the year at a pressure not less than 68.9m (10 psig) and that serves a single residence.

* An excess flow valve meeting the performance standards prescribed under 192.381 shall be installed by the operator.
* An excess flow valve shall be designed to shut off the flow of natural gas automatically if the service line breaks.

Purpose and Scope

This numbered document provides use and design information for selecting, installing, maintaining, and documenting EFVs. Supplements to this document may be found in the manufacturer's product manuals and catalogs, and in the numbered documents listed in the "References" section.

Acronyms

APD: ABNORMAL PEAK DAY

ASTM: AMERICAN SOCIETY FOR TESTING AND MATERIALS

CFR: CODE OF FEDERAL REGULATIONS

CTS: COPPER TUBING SIZE

DOT: DEPARTMENT OF TRANSPORTATION

EFV: EXCESS FLOW VALVE

GPRP: GAS PIPELINE REPLACEMENT PROGRAM

HVTT: HIGH-VOLUME TAPPING TEE

IPS: IRON PIPE SIZE

MAOP: MAXIMUM ALLOWABLE OPERATING PRESSURE

PE: POLYETHYLENE

PSIG: POUNDS PER SQUARE INCH GAUGE

QC/S: QUALIFIED CONTRACTOR/SUBCONTRACTOR

SCFH: STANDARD CUBIC FEET PER HOUR

WRO: WORK AT THE REQUEST OF OTHERS

References Document

Polyethylene Mechanical Fitting Connections Utility Work Procedure WP4170-08

Material Problem Reporting (MPR) Utility Standard S2333

Specifications for Furnishing and Delivery of Non-Corrodible Mechanical

Fittings for Polyethylene (PE) Plastic Gas Piping and Tubing EMS 4761

Standard Test Method for Performance Testing of Excess Flow Valves ASTM F-1802

Standard Specification for Excess Flow Valves for Natural Gas Service ASTM F-2138

General Information

The United States DOT required gas distribution utilities to have an EFV program effective February 3, 1999. Since then, Congress has specified in the 2006 Pipeline Safety (PIPES) Act that all operators of gas distribution systems install EFVs in lieu of customer notification. This change went into effect in June 2008. The applicable DOT requirement is 49 CFR 192.383. The Company has installed EFVs in lieu of providing notification to affected customers since the original request was implemented. EFVs are spring operated and control the flow of gas through a service line when the flow rate exceeds a predetermined quantity. EFVs must perform to the requirements of 49 CFR 192.381. As such, careful sizing of the EFV is critical. EFVs are typically installed in a coupling and activate when a gas service line is severed due to a dig-in. All EFVs supplied with mechanical ends must meet the requirements listed in Engineering Material Specification 4761. All EFVs supplied must meet the requirements of ASTM F-1802 and ASTM F-2138. The EFV has a bleed-by mechanism that will reopen the EFV when the pressure on both sides equalizes.

Application

1. New Service: Single services on systems with an MAOP greater than or equal to 15 psig and a main pressure greater than or equal to 10 psig to serve new, single family residential customers with one gas meter. Install EFVs on new service stubs as close as practical to the main.

2. Reconstruction: Single services that feed single family residential customers with one gas meter and are replaced during a job that has been planned and engineered.

3. Contact the **Plastic Hotline (800-223-9161 or 415-973-9161)** for installation information about EFVs on services larger than 2" IPS, loads greater than 4,400 scfh, or for assistance with the application of this document.

Limitations

1. EFVs are not required on branch services and should not be installed in those locations.
2. Do not install EFVs on steel services. Replace these services with PE services.
3. EFVs are not required on systems that can have a minimum pressure below 10 psig. Low-pressure systems and some semi-high and high-pressure systems are included in this category.
4. EFVs are not required on services that are replaced in an emergency or on a short lead-time basis. Service replacements to repair Grade 1 leaks are included in this category. Service replacements to repair Grade 2+ and Grade 2 leaks that are not part of an engineered main replacement job are included in this category. Usually, this occurs when a gas crew determines that the condition of the service line is such that a full replacement of the service is the best repair method.
5. EFVs are not required on services that have more than one meter.
6. EFVs are not required on services that are serving other than a residential customer (e.g., serving a commercial/industrial customer).
7. EFVs are not required on services that are partially replaced, such as service alterations.
8. EFVs are not required on services where there is a reasonable expectation that an additional meter(s) will be added in the future. This includes installations where a multi-family dwelling may be constructed.
9. EFVs shall not be installed on service lines with contaminants in the gas stream, where these contaminants could be expected to cause the EFV to malfunction or where the EFV would interfere with the necessary operation and maintenance activities on the service, such as blowing liquids from the line.
10. Only employees, contractors with a current OQ qualifications may install an EFV.
11. EFVs shall not be installed on 1/4" CTS services or on any service where a portion of the service has 1/4" CTStubing.

Guidelines for Selecting an EFV Based on the MAOP

Table 1, illustrates the system capability requirements for EFVs. Any variances from the requirements listed shall be approved by gas engineering personnel. Any variances shall be determined on a case-by-case basis.

EFV Selection Guide

The tubing or pipe size on the ends of EFV fittings and the service tubing or pipe size shall be the same. The EFV flow model shall be selected according to the criteria found in the cases below and in Table 2 on Page 4. Pressures listed refer to the minimum APD main pressure that could occur.

Table 1 EFV Requirements - System MAOP Rating and APD Performance

System MAOP	APD Main Pressure	EFV Required
15 psig	N/A	No
15 psig	10 psig	No
15 psig	10 psig	Yes

Customer loads are total connected loads that are determined at the time of the service request or during service design for reconstruction. EFVs should be designed for proposed/existing total connected loads and not based upon anticipated future loads.

For all 1/2" CTS plastic gas services with service line lengths up to 122 feet and customer loads less than 320 scfh, install a 400 Series EFV. This represents most single family residential installations.

For all 1/2" CTS plastic gas services with service line lengths up to 28 feet and customer loads more than 320 scfh, but less than 640 scfh, install a 800 Series EFV. If the service length goes beyond 28 feet, install a 1" CTS service with a 1" EFV as required.

If the 1/2" CTS service line is in excess of 122 feet and customer loads less than 320 scfh, install a 1" CTS service with a 1" 800 EFV. The maximum service length is 1 ,000 feet.

For all 1" CTS plastic gas services with service line lengths up to 1,000 feet and customer loads less than 640 scfh, install a 1" CTS service with a 1" 800 EFV.

For all 1" CTS plastic gas services with service line lengths up to 261 feet and customer loads greater than 640 scfh, but less than 880 scfh, install a 1" CTS service with a 1" 1100 EFV.

For all 1" CTS plastic gas services with service line lengths up to 122 feet (note that 122 feet is limiting) and customer loads greater than 880 scfh and less than 1,440 scfh, install a 1" CTS service with a 1" 1800 EFV.

For 1-1/4" I PS service lines, 1" CTS service lengths in excess of the maximum protected lengths as noted, or customer loads between 1,440 scfh and 2,043 scfh and service line lengths less than 960 feet, install a 1-1/4" I PS service with a 1-1/4" 2600 EFV.

For all 2" IPS plastic gas services, customer loads between 2,043 scfh and 4,400 scfh with service line lengths less than 2,560 feet, install a 2" IPS plastic gas service with a 2" EFV. If the line length is in excess of 2,560 feet or customer load is in excess of 4,400 scfh, do not install an EFV .

Table 2 Service Size and EFV Series as a Function of Load and Line Length 1, 2

Length in Feet	TOTAL CONNECTED LOAD					
	0-320	321-640	641-880	881-1440	1441-2043	2044-4400
0-28	1/2" - 400	1/2" - 800	1" - 1100	1" -1800	1 -1/4" - 2600	2"-5500
29-122	1/2" - 400	1" - 800	1" - 1100	1" -1800	1 -1/4" - 2600	2"-5500
123-261	1" - 800	1" - 800	1" - 1100	1 -1/4" - 2600	1 -1/4" - 2600	2"-5500
262-960	1" - 800	1" - 800	1 -1/4" - 2600	1 -1/4" - 2600	1 -1/4" - 2600	2"-5500
961-1000	1" - 800	1" - 800	2"-5500	2"-5500	2"-5500	2"-5500
1001-2560	2"-5500	2"-5500	2"-5500	2"-5500	2"-5500	2"-5500

1 Length of service is determined from the EFV location to meter.
2 Sizing criterion: 10 psig main pressure, maximum pressure drop across device, average 10 of service pipe or tubing, and trip at 50% above minimum trip flow at 10 psig.
3 Total connected load not to exceed 80% of minimum trip flow at 10 psig.
4 No EFV required on loads greater than 4,400 seth.
5 No EFV required on services longer than 2,560 feet.

Table 3 Model Descriptions and Code Numbers

Flow Series	Sz Inches	Type of Valve Ends	Pressure Drop	Code
Low Flow Series 400	½ CTS	Ends	0.75	020948
Medium Flow Series 800	½ CTS	Ends	1.40	020950
Medium Flow Series 800	1 CTS	Ends	1.40	020953
Medium Flow Series 1100	1 CTS	Ends	3.00	021706
High Flow Series 1800	1 CTS	Ends	3.20	020956
Ultra High Flow Series 2600	1-1/4 IPS	Ends	4.90	021709
Ultra High Flow Series 5500	2IPS	Ends	0.50	021710
Extra Metal Tags for EFV's				020957

Field Installation Instructions

1. Install the EFV as close to the gas main and tee as possible. Refer to Numbered Document A-90 for an illustrationof a typical installation. On 1/2" and 1" CTS services install a short section of service tubing (approximately 8" - 12" long) between the service tee and the EFV. If the installation of substructures requires that the EFV be installed farther than 12" from the service tee, install the EFV as close to the tee as practical. For 1-1/4" and 2" IPS services, install a short section of pipe (approximately 15" - 18" long) between the service tee and EFV. The short section of service tubing and piping located between the service tee and the EFV is required for future squeezing needs. This additional length allows the EFV to be removed in the future, if necessary, without removing the service tee. Note that, if the EFV will be directly connected to a steel-to-PE transition fitling (HVTT or an electrofusion tee), no additional piping is required. If the EFV malfunctions or requires replacement, the service tee will have to be stopped off. Do not squeeze the PE upstream of the EFV.
2. Do not install an EFV on 1/4" CTS plastic service.

3. Chamfering tools used to install EFVs are listed in Numbered Document 8-91.1 . Refer to Utility Work Procedure WP4170-08 for installation instructions.
4. Install the EFV with the directional arrow in line with the flow of the gas and pointing toward the gas meter. The adhesive stickers on EFVs are color-coded, indicating the flow model and flow direction of the EFV. Enhanced the design by molding the arrow into the body of all EFVs. This will allow the installer to identify the proper flow direction if the label is damaged or missing. All new EFVs with 1" CTS ends are tapered in the center. All EFVs perform similarly. The most commonly used medium-flow Series 800 EFV is color-coded orange. The low-flow Series 400 is blue. The medium-flow 1100 Series is grey. The high-flow Series 1800 is green. The ultra-high-flow Series 2600 is pink and the 5500 Series is white. If an EFV is inadvertently installed with the flow direction going the wrong way, the EFV will flow normally, but will not activate. It must be removed and installed properly.
5. Direct bury the EFV. No valve frame or cover is required.
6. All EFVs are composed of either PE 2406/2708 or PE 3408/4710 on the outside and do not need to be cathodically protected.
7. The EFV is supplied with a small metal identification tag and an adhesive tag. Install the metal tag on the gas service riser at the gas service valve location. Use the nylon tie supplied to install the metal tag. Install the adhesive sticker on the gas riser sun shield.
8. On stub services, leave the metal tag and adhesive sticker in the EFV plastic bag and wrap the bag around the buried stub. When the service is completed, attach the tag and sticker at the riser.
9. If necessary, remove large amounts of debris from the service line before installing an EFV.
10. EFVs are similar to other mechanical and fusion fittings and shall be air tested per Numbered Document A-34. EFVs have the same pressure rating as other plastic gas distribution pipes and fittings. The manufacturer's installation instruction recommends pressurizing a service slowly during the air test. For a typical 50'-100', 1/2" or 1" service, the manufacturer recommends a time of at least 15 seconds to fully pressurize the service. High flow, above 1 ,800 seth, may cause the EFV to trip. When testing from the riser, a high flow rate can cause the spring and ball of the EFV to lock together, causing the EFV to malfunction and require replacement. Depressurize the service at a slow flow rate because of possible activation.
11. Do not squeeze an EFV.
12. Purge the service in accordance with this document.
13. Indicate the location of the EFV on the "as-built" gas service order. Include the distance from the property line. Verify the flow series used and indicate the mechanical type of the installed EFV on the gas service order. EFVs may be reused if they are in good working order, have not been subjected to damage, and are sized in accordance with this document. Evaluate the cost savings of this option on a case-by-case basis.

<table>
<tr><td>EFV Brand</td><td></td></tr>
<tr><td>Type</td><td></td></tr>
<tr><td>Flow Series</td><td></td></tr>
<tr><td colspan="2">☐- ½" ☐-1" ☐-1-1/4" ☐-2"</td></tr>
</table>

Figure 2
Template to Stamp Gas Service Records
Mapping Instructions

1. Map EFVs on the plat sheets.
2. Use the established symbol for "Gas Service with EFV."
3. Indicate whether or not an EFV is installed.
4. Verify that the stamp is properly completed. Contact the appropriate construction group to obtain missing information.

Purging Gas Services

1. Look for the EFV identification tag on the gas service valve, riser, or the riser sun shield. If the tag is present, an EFV is installed on the service.
2. When purging a gas service, open the gas service valve very slowly. If the valve is opened too quickly, the resulting rapid flow of gas may cause a pressure spike that can activate the EFV. Depending on the main pressure, size, and length of tubing, the EFV may activate when purging to atmosphere even if the gas valve is opened slowly. Purge the service line with compressor air, install the EFV, and then slowly purge the entire service. If the EFV activates during purging, close the gas service valve and wait until the pressure equalizes. Attempt to re-purge. The preferred method of purging is to gradually open the service valve to prevent tripping the EFV.
3. When performing service work after the regulator at the meter set, removing a plug or associated piping too quickly can create a pressure spike and activate the EFV.
4. If the EFV activates, shut off the service valve and wait a few minutes for the line to repressurize the bleed-by mechanism. If an EFV activates, the time that it takes for the pressure to equalize varies depending on the main pressure, the service size, and the length of service. For example, if the main pressure is 60 psig, a 6' long, 1/2" CTS service equalizes in approximately 10 seconds, and a 100' long, 1" CTS service equalizes in about 5 minutes.
5. Do not intentionally activate the EFV during installation or purging to test the device.
6. Do not use the EFV as a means of pressure control on the service in lieu of stopcock changer equipment, squeezers, or pinning off the service tee.

140 Startup and Shutdown Gas Pipelines

140.1 General

This section details the steps necessary for startup of steel and plastic distribution systems.

140.2 Design Criteria

The Gas Operator shall determine the sequences of startup of a segment of a steel or plastic distribution system, and shall take into consideration the following:

140.21 The system shall be examined for design criteria, material, valves or fittings not capable of withstanding the proposed maximum allowable operating pressure.

140.23 The proposed maximum allowable operating pressure shall be consistent with the system it feeds and any and all customer operating systems the system feeds.

140.24 The test pressure and duration of the test shall be determined in accordance with requirements of the CFR, 49, and shall be specified on the startup plans. See: **101, Pressure Limitations**.

140.25 Customer metering facilities shall be so designed to protect the customer against abnormal operating conditions pressure regulations.

a. The gas meter shall be installed so as to handle the anticipated pressure within the systems MAOP.
b. The service regulators shall be proposed for installation on all service lines upstream of the meter.
c. Pressure limiting devices shall be examined for maximum allowable working pressure and proper orifice and size for installation.

Customers receiving line pressure delivery shall be contacted to determine a mutually agreeable delivery pressure, and if any regulation or limiting devices need to be install as startup procedures are implemented.

d. All pressure regulators and other pressure limiting devices to be utilized on service lines and meter centers on a high pressure system shall meet the requirements of 49 CFR, Part 192.197(c), "Control of the Pressure of Gas Delivered from High -Pressure Distribution Systems".

140.3 Application Procedures

The Gas Operator, and all affected administrators shall see that the appropriate personnel are instructed in the proper application of the startup procedures.

140.31 The startup process shall be conducted in a systematic manner to insure adequate safety of all concerned.

140.32 Safe operation as the pressure is increased shall be made prior to beginning the startup process.

140.34 A service regulator and or other pressure limiting devices shall be installed on each service line and tested to insure proper functioning of the device.

140.35 The pipeline shall be tested in accordance with the predetermined test pressure and test duration. Test pressures and duration shall compile with engineering guidelines mention in 49 CFR, Subpart B, 192.51, Scope (qualification of pipe in pipelines), 49 CFR, Subpart B, 192.53, General (material for pipe and components), 49 CFR, Subpart B, 192.55, Steel Pipe, and 49 CFR, Subpart B, 192.59, Plastic Pipe. Strong consideration shall be given to 49 CFR, Subpart C, 192.115, Temperature Derating Factor (T) For Pipelines Pressure Testing. Pipeline pressure testing shall be exercised to ensure accuracy in the pressure and duration of the pipeline test. All pressure and duration testing of a pipeline shall be followed with a legal accountability "EXIT" pressure test. This shall be done to eliminate any discrepancies involving pressure and temperature during long duration testing. NOTE: Converting temperatures to "ABSOLUTE" quantities (Rankin to Kelvin.) All criteria listed in 49 CFR, Subpart C, 192.101, 103, 105, 107, 109, 111(b)(c)(d), and 113 shall be adhered too.

During startup pressure increases, allow adequate time for the system to stabilize. Regulation and limiting devices shall not be subjected too, elevated pressures rapidly. All increases shall be administered slowly and allowed to stabilize.

140.4 Planned Shutdown

These guidelines are designed to assist responsible personnel (who are qualified by experience and training) in conducting a planned shutdown of a distribution line. These guidelines give full consideration to the safety and protection of people and property. Routine maintenance operations can be accomplished safely and effectively by adhering to established procedures (consistent with these guidelines) used in the day-to-day operations. Other shutdowns may require specific plans and coordination with various operator departments and outside groups. Many elements are set forth in these guidelines and not all will be applicable to any particular shutdown.

140.41 Planning, Preparation and Written Procedures

Planning and preparation.
(a) The plan should provide for the exercise of full control of the gas in the segment, and the adjoining or affected facilities, at all times during the operation (including the shutting down, the down period and the return to service).

The following are among the factors to be considered in planning.
(1) Facilities affected by the shutdown.
(2) Sequence of operating valves and devices.
(3) Verification of valve closure by:
- a. Counting turns to close.
- b. Block and bleed technique.
- c. Observation of position Indicators.

d. Timing.

(4) Automatic valves.
(5) Settings of affected safety devices, regulators and control devices.
(6) Switching of meter stations.
(7) Installation of line stoppers in distribution work.
(8) Supply to customer service lines.
(9) Gas flow capacity of affected equipment and facilities.
(10) Monitoring of pressures during each phase of the operation. "
(11) Blowdown location, conditions and procedures.
(12) Venting and control of any leakage past closed valves and closures.
(13) Purging conditions and procedures.
(14) Repressuring for return to service.
(15) Alternate gas control procedures to be used in an emergency.

(b) During the planning, it should be determined if there is any additional work which needs to be performed which would also require a shutdown. If practicable, this additional work should be incorporated in the plan. This will reduce the number of shutdowns and thereby enhance the overall continuity and safety of the pipeline operation.
(c) Schedule the shutdown at the most advantageous time and as far in advance as possible. The following are among the factors to be considered in the scheduling.

(1) Pipeline gas flow-load conditions.
(2) Special operating problems.
(3) Customer gas demands.
(4) Continuity of service to customers.
(5) Coordination with. gas suppliers ~nd interconnecting operators.
(6) Condition of readiness at work sites.
(7) Availability of materials, personnel and equipment.
(8) Weather conditions.
(9) Time of year.

(d) The plan, or appropriate parts of it, should be disseminated to pertinent operator personnel for review and approval prior to shutdown. Sufficient lead time should be allowed for proper review and approval.

140.42 Written Procedures

(a) Standard written operating procedures or plans, which have been developed and qualified over a period of time, may be used (and supplemented) if appropriate. A complex shutdown should be covered by a plan specifically written for that shutdown. The written elements need not be compiled in one place nor in one document.
(b) The procedure should include the use of a line drawing or a schematic diagram of the segment to be shut down.
(c) The plan should designate personnel responsibility for the various aspects of the shutdown.
(d) The plan should include provisions for notification of proper authorities prior to the shutdown and for obtaining assistance in an emergency situation. It should provide notification procedures or lists, at appropriate locations, which would incorporate items such as available emergency medical facilities, other utility operators, civil agencies and governmental agencies (including fire, police and sheriff's departments).
(e) The scope and nature of the work will determine the extent of coordination and involvement of various groups. These groups may include customers, gas suppliers, governmental agencies, other pipeline and utility operators, and affected departments or divisions (such as pipeline, compressor, engineering, dispatching, safety, measurement and regulation, right-of-way, gas supply, gas sales, distribution and customer service).

140.43 General Preshutdown Activity

Preshutdown briefings.

(a) A preshutdown briefing should be conducted by the supervisor in charge. This meeting should include such topics as the following.

(1) Work assignments.
(2) Duties to be performed and order of performance.
(3) Means of communication.
(4) Pressure limits to be maintained.
(5) Normal and abnormal conditions that may be expected.
(6) Alternate procedures in the event of an emergency.
(b) Appropriate governmental agencies, civil agencies and other utility operators should be notified.

Preshutdown actions.
The operator should:
(a) Ensure proper functioning and serviceability of valves, and other devices, which will be used to block or control the gas, making inspections and doing necessary servicing.
(b) Place under manual control those automatic valves which might be adversely affected.
(c) Adjust or change the settings of pressure limiting stations, district regulator stations, relief stations, relief valves and other control equipment (as required) to maintain safe pressures throughout the system.
(d) Take precautions to minimize fire hazard where liquid hydrocarbons can be expected at a pipeline cut.
(e) Do as much of the following work (as is practical or necessary and consistent with safe operating practices) prior to the shutdown.
(1) Excavate, identify and verify the pipeline at the work site.
(2) Clean and inspect the exterior of the pipe.
(3) Check pipe for undersize or oversize.
(4) Install taps for blowdowns or vents.
(5) Install bypass equipment.
(6) Install fittings for line stoppers.
(7) Deactivate rectifiers.
(8) Arrange for nondestructive testing.
(9) Check availability and operating condition of required work equipment.
(10) Provide and check fire extinguishers.
(11) Calibrate pressure test gauges and recorders, and ensure that their connections are not obstructed.
(12) Check gas detection equipment for satisfactory condition and availability, and the availability of personnel qualified to operate the equipment.
(13) Provide for first aid equipment, supplies and protective clothing.

140.44 Gas Control Activity
Preshutdown.
Before commencing the shutdown, the person in charge of the operation should determine that:
(a) All personnel and equipment are at assigned locations.
(b) Everything is ready at the job sites.
(c) Conditions in the gas system are conducive to satisfactory shutdown.

During shutdown.
(a) Caution should be exercised to prevent accidental gas ignition when blowing down, venting or purging facilities. Consideration should be given to the:
(1) Proximity of houses, plants or buildings.
(2) Proximity of pedestrian, automotive, rail or air traffic.
(3) Proximity of electric transmission lines.
(4) Potential ignition sources in the blowdown area.
(5) Wind direction and velocity.
(6) Restricting of access to blowdown area.
(b) Gas pressures in the system should be continuously monitored. Pressures should be maintained within the prescribed limits during the period from the shut-in and blowdown, to the repressuring and return of the system to normal operating conditions.

(c) Where line packing is necessary or desirable, or where the shutdown may cause a pressure buildup, special attention should be taken to avoid exceeding maximum allowable operating pressures.
(d) When the shutdown will cause installed pressure regulating or overpressure protection devices to be ineffective, the procedures established should at least provide that:

(1) Operations are carried out by personnel qualified by training and/or experience.
(2) Personnel are instructed in the operating characteristics of the components of the pipeline facilities affected.
(3) Pressures in the affected facility are continuously monitored utilizing gauges (which should be selected after considering pressure levels and degree of control required).
(4) Communications are established to ensure proper coordination of work.
(5) Valves used for manually throttling pressures are constantly attended.

140.45 Establishing Safe Gas Conditions at the Work Site

Standard procedures.
Established standard procedures should be used for cutting and welding operations, for the venting of gas leakage, and for maintaining safe gas conditions during the progress of the work.

Pressure buildup behind end closures.
A positive method should be provided for preventing pressure buildup against temporary or unbraced end closures. End closures which are to be operated under pressure should be braced or anchored.

Electrical grounding.
Bonding cables, grounding rods or grounding mats should be used to minimize hazards from electricity.

140.46 Return of Shutdown Section to Operation

Operator's determination.
The person in charge should determine when the facility is ready to return to service.

Standard procedures.
Established standard procedures (modified or supplemented as appropriate) should be followed to purge, repressure and return all facilities to normal operation. These procedures should consider the potential for unknown hazards and include evacuation of personnel from excavations until all conditions are determined to be safe.

Flow rates.
Flow rates should be carefully controlled during repressuring, and pressures should be monitored until normal operations have been established.

Return to normal settings.
Pressure limiting stations, district regulator stations, relief valves, automatic valves and other control equipment should be returned to their normal settings.

141 Dispatcher Procedures

Written procedures shall state the purpose and objectives of the emergency plan and provide the basis for instructions to appropriate personnel. The objective of the plan should be to ensure that personnel who could be involved in an emergency are prepared to recognize and deal with the situation in a timely and safe manner.

Human Factors;

Human Factor regulations in order to realize the safety benefits, deadline to implement the procedures for roles and responsibilities, shift change, change management, and operating experience, fatigue mitigation education and training is now **October 1, 2011.**

This rule is effective August 15, 2011.

To ensure the safety of the general public, they shall provide for the following:

141.1 Receiving, identifying and classifying emergencies.

(a) Provisions shall be made to ensure prompt and adequate handling of all calls which concern emergencies (192.615(a)(3)) whether they are from customers, the public, employees, or other sources;

(1) Arrangements for receiving notification of an emergency at any hour of the day.
(2) Direction to employees who receive calls including the following.
 (a) The information to be obtained from the caller.
 (b) The designation of the operator personnel (in accordance with the type of emergency) to whom the information should be directed.
(3) Instructions shall ensure that the information received is evaluated to determine the priority for action. Some situations call for personnel to be dispatched for an on-the-scene investigation. Personnel shall respond in an urgent manner giving a potential emergency top priority until the severity of the situation has been determined. Some situations require that priority be given to other actions, such as notification of gas control or emergency response personnel.

141.2 Establishing and maintaining adequate means of communication.

Arrangements made for establishing and maintaining adequate public and operator communications should be described. These arrangements should include means of communication with appropriate fire, police and other public officials, and should consider the need for the following.
(a) Continuously updated operator and public emergency call lists that will show how to contact personnel that may be required to respond to an emergency at any hour.
(b) Multiple telephone trunk lines to the emergency operations center.
(c) Additional switchboard facilities and personnel.
(d) "Unlisted" telephone service to ensure accessibility to operator-only calls.
(e) Additional fixed and mobile radio equipment.
(f) Standby electrical generating equipment for communications power supply.
(g) Dissemination of accurate information to the news media and cooperation with the news media on the scene.

141.3 Prompt and effective response to each type of emergency.

Various types of emergencies will require different responses in order to evaluate and mitigate the hazard. Consideration should be given to the following.
(a) Emergencies involving gas detected in or near buildings shall be prioritized in order to have sufficient personnel for response.
(b) Emergencies involving fire located on or near pipeline facilities may require those facilities to be isolated. If a major delivery point is involved, an alternative gas supply may be needed.
(c) Emergencies involving an explosion on or near pipeline facilities may result in damage from fire and shock waves.
(d) Natural disasters, such as earthquakes, floods, hurricanes, tidal waves, or tornadoes, may affect the safe operation of pipeline facilities in many different ways. Operator personnel should be dispatched to affected areas as soon as possible to evaluate the situation and proceed with emergency response as necessary to keep or make conditions safe. Operators of pipeline facilities subject to natural disasters should consider preparing a natural disaster plan. The plan may include the following.
(1) Information on responsibilities for operator personnel communication and work assignments.
(2) Information on alternative reporting locations for operator personnel in case the primary location is damaged or inaccessible.
(3) Procedures to assess damage and mitigate hazardous conditions may include the following.
(4) Establishing an operations/communications command center.
(5) Establishing field command post.
(6) Determining manpower, material, and equipment requirements.
(7) Determining extent of damage to pipeline facilities.
(8) Procedures to re-establish normal operations including service restoration and progress tracking and reporting.
(9) Other considerations.

(a) Maintaining mutual assistance agreements with other operators.
(b) Providing accommodations for operator's personnel and other assisting personnel.

141.4 Emergency Employee Procedures Manuals

Provide employees copies of emergency procedure manual.

The written emergency procedures and plans should be made accessible so that employees may become familiar with them. Consideration should be given to placing a copy near telephones and base radio units that might be used to notify the operating personnel of an emergency.

141.5 Training of employees.

Appropriate operating and maintenance employees shall be trained to ensure that they are knowledgeable of the requirements of the written emergency procedures. Persons providing training of the emergency procedures shall be knowledgeable in emergency response and training. Consideration shall be given to conducting classroom and/or field simulated emergency exercises involving appropriate personnel, such as operating, maintenance, and dispatch personnel, including those monitoring and controlling operations of remote facilities. Emergency controlling dispatchers with the potential of receiving all reportable emergencies shall be trained to respond to each specific scenario. Such groups shall include 911 call groups but not exclude local and rural volunteer call groups. Emergency exercises should include worst case scenarios. The effectiveness of the training may be verified by methods such as oral test, written test, or evaluating performance during simulated emergencies. Those responsible for instruction of employees should place special emphasis on the following.
(a) Understanding the properties and behavior of the gas, as related to types of potential hazard.
(b) Coordinated execution of the operator's written emergency procedures.
(c) Knowledge of how emergency control is exercised in various sections of the system (including identification and operation of key valves).
(d) Ability to use operator's maps or other facility records.
(e) Responsibilities of each employee responding to an emergency and the relationship to the emergency procedure.
(f) Evaluation of reports of gas odor and other potential emergencies.
(g) Response to different types of emergency situations (such as gas escaping inside/outside and gas burning inside/outside). Appropriate actions should include avoiding the use of doorbells or buzzers when responding to possible leaks, evacuation, elimination of ignition sources, gas shutoff, ventilation, and other precautionary measures. Dispatchers should provide safety announcements responsively. Caution should be exercised during an announcement.
(h) Familiarization with tools and equipment appropriate to the particular function or situation.
(i) Fulfillment of the record keeping requirements called for under the written emergency procedures. This should include a log of the emergency calls and the validation and documentation of the corrective action taken.
(j) Training on the proper use of the Maze Expander Unit and the carbonation dispenser.

141.6 Review of employee activity

Following each emergency, employee activities should be reviewed to determine whether the procedures were effectively followed by examining the log of events and action taken. Consideration should be given especially to wether responses to the emergency were timely. Also, consideration should be given to the need for changes in the written procedures as may be indicated by the experience of the emergency.

141.7 Prevention of Fatigue

Fatigue is described as the physical and/or mental, emotional exertion which can impair and affect, strength, speed, reaction time, coordination, decision making, and physical balance.

Signs of Fatigue

1. Constant yawning.
2. Blurred vision.
3. Heavy or sole eyes.
4. Poor concentration.
5. Slow reaction time.

6. Poor judgment.
7. Speech slurred.
8. Headaches.
9. Low exertion force.
10. Leg pains.
11. Loss of appetite.
12. Giddiness.
13. Constant flagellation. (Medical Research Council)(Behavioral Health.)(Published 2001 Neuroscience Journal.)
14. Attention span loss.
15. Irregular heart beat.
16. Arms and leg heaviness.
17. Eye-hand coordination.
18. Inability to control excessive vocalization (Neurological Disorder.)(Johnson 13^{10} Disorder.)

Causes of Fatigue

1. Lack of sleep.
2. Quality of sleep.
3. Circadian rhythms.
4. Offsetting shifts.
5. Extended hours (no greater than 16 hours.)(Utility policy.)
6. Diet.
7. Alcohol and/or drugs, caffeine.
8. Medication (prescribed.)

Recommendations

1. Reduce extended work hours.
2. Take schedule breaks. If breaks are not provided, then get up and move about. Initiate blood flow to extremities.
3. Try to perform heavy exertion early verses later in the work shift.
4. Monitor signs of fatigue. Active a check list of normal daily body and mind functions.

APPENDIX I
DEPARTMENT OF TRANSPORTATION (D.O.T.) REPORTING REQUIREMENTS

191.5 Telephonic Notice of Certain Incidents

(a). At the earliest practicable moment following discovery (within TWO (2) HOURS if at all possible), Tompkinsville Gas Operator shall give notice, in accordance with paragraph (b.) of this section, of each incident that:

(1) Involved release of gas from a pipeline or release of liquefied natural gas or gas from a L.N.G. facility, and:

(I) Caused a death or personal injury requiring in patient hospitalization (must be confirmed); or

(ii) caused estimated property damage of $50,000 not including the cost of gas lost, to Tompkinsville Gas Operator and/or others.

(2) In the judgment of Tompkinsville Gas Operator was significant even though it did not meet the criteria of paragraphs (1) or (2).

(b.) Each notice required by paragraph (a.) of this section shall be made by telephone to:

NATIONAL RESPONSE CENTER (WASHINGTON, D.C.) **1-800-424-8802**

The following information shall be reported:

(1) Name and phone numbers of Tompkinsville Gas Operator and person(s) making report.

(2) The location of the incident.

(3) The time of the incident.

(4) The number of fatalities and personal injuries, if any.

(5) All other significant facts that are known by Tompkinsville Gas Operator that are relevant to the cause of the incident or extent of the damages.

191.9 Distribution System: Incident Report

(a.) Except as provided in paragraph (c.) of this section, Tompkinsville Gas Operator shall submit a **Department of Transportation Form RSPA F 7100.1** as soon as practicable, but not more than 30 days after detection of an incident that required notice by telephone under Section 191.5.

(b.) When additional relevant information is obtained after the report is submitted under Paragraph (a.) of this section, Tompkinsville Gas Operator shall make supplementary reports, as deemed necessary, with a clear reference by date and subject to the original report.

(c.) The incident report required by this section need not be submitted with respect to L.N.G. Facilities.

191.11 Distribution System: Annual Report

(a.) Except as provided in paragraph (b.) of this section Tompkinsville Gas Operator shall submit an annual report on the **Department of Transportation Form RSPA F 7100.1-1.**

NOTE: This report must be submitted not later than March 15, for the preceding calendar year.

(b.) The annual report required by this section need not be submitted with respect to L.N.G. facilities.

191.13 Distribution Systems Reporting Supplier Pipelines

Tompkinsville Gas Operator shall submit separate reports for its Supplier pipeline system as required by Sections 191.15 and 191.17 below.

191.25 Filing Safety Related Condition Report(s)

A written report of each safety-related condition, as defined in Section 109 of these procedures, shall be submitted to the U.S. Department of Transportation and Kentucky Public Service Commission so that it is received by the secretary within five (5) federal working days after the day an authorized representative of Tompkinsville Gas Operator has determined the condition to be safety-related, but not later than ten (10) working days after the day the condition is first discovered. This report must be filed on a "Safety-Related Condition Report" form (Appendix III). **NOTE: Reports shall be electronically submitted.**

192.16 Customer Notification

Tompkinsville Gas Operator does not maintain customer owned, buried service piping. Therefore, Tompkinsville Gas Operator must notify affected customers once, in writing, of the following information:

(1) Tompkinsville Gas Operator does not maintain the customer's piping.

(2) If the customer's buried piping is not maintained, it may be subjected to the potential hazards of corrosion and leakage.

(3) Buried gas piping should be:

- (a) Periodically inspected for leaks
- (b) Periodically inspected for corrosion if the piping is metallic; and
- (c) Repaired if any unsafe condition is discovered.

(4) When excavating near buried gas piping, the piping should be located in advance, and excavation done by hand.

(5) Plumbers and heating contractors may locate, inspect, and repair the customer's buried piping.

Such notification shall be made no later than August 14, 1996 or ninety (90) days after the customer first receives gas at a location where such piping has been identified.

Tompkinsville Gas Operator must make the following records available for inspection to the Kentucky Public Service Commission, a copy of the notice currently in use; and evidence that notices have been sent to customers within the previous three (3) years.

192.383 Excess Flow Valve Customer Notification

- All plastic (PE) service line customer will have an "Excess Flow Valve" installed on their service line at no charge. (See Tompkinsville Excess Flow Valve notification form)

What records are required:

An operator must make the following records available for inspection by the Administrator or a State agency participating under 49 U.S.C. 60105 or 60106:

- A copy of the notice currently in use and
- Evidence that notice has been sent to the service line customers set forth in paragraph (b) of this section, within the previous three years.

When notification is not required:

The notification requirements do not apply if the operator can demonstrate the following:

- That the operator will voluntarily install an excess flow valve or that the state or local jurisdiction requires installation;
- That excess flow valves meeting the performance standards of 192.381 are not available to the operator;
- That an operator has prior experience with contaminants in the gas stream that could interfere with the operation of an excess flow valve, cause loss of service to a residence, or interfere with necessary operation or maintenance activities, such as blowing liquids from the line.
- That an emergency or short time notice replacement situation made it impractical for the operator to notify a service line customer before replacing a service line. Examples of these situations would be where an operator has to replace a service line quickly because of:
- Third party excavation damage;
- Grade 1 leaks
- A short notice service line relocation request

APPENDIX II
TOMPKINSVILLE-INCIDENT REPORTING REQUIREMENT

Incident Reporting:

(1) An invent involves the release of gas from a pipeline, that results in one or more of the following consequence:
  (i.) a death or personal injury necessitating in-patient hospitalization, or
  (ii.) estimated property damage of $50,000 or more, including loss to the Tompkinsville Gas Operator and/or others or both, but excluding cost of gas lost;
  (iii.) Unintentional estimated gas loss of three million cubic feet or more;

(2) Activation of an emergency shutdown of a system for reasons other than an actual emergency does not constitute an incident.

(3) An event that is in the judgement of Tompkinsville, even though it did not meet the criteria of paragraphs (1) or (2) of this definition.

191.5 Immediate notice of certain incidents.

(a.) At earliest practicable moment following discovery, **(within 2 hours)** each operator shall give notice in accordance with paragraph (b) of this section of each incident as defined in 191.3.

(b.) Each notice required by paragraph (a) of this section must be made to the National Response Center, either by telephonic reporting **(800-424-8802)** (Washington, DC, (202-267-2675) or electronically at http://www.nrc.uscg.mil and must include the following information:

©.) Notify Kentucky Public Service Commission-Pipeline Safety Division

(1.) Names of operator and person making report and their telephone numbers.

(2.) Location of incident.

(3.) The time of the incident.

(4.) The number of fatalities and personal injuries, if any.

(5.) All other significant facts that are known by the operator that are relevant to the cause of the incident or extent of the damages.

(6.) A copy of the annual report required by DOT under Section 192.11 and 191.17 must be sent to the KPSC.

(7.) A copy of each "Safety-Related Condition Report" submitted to the U.S. Department of Transportation under 191.25 must be submitted to the Kentucky Public Service Commission.

Notification of Construction:

E. Prior to beginning any construction involving $8,000, Tompkinsville Gas Operator must notify the Kentucky Public Service Commission in writing, furnishing the following information:

(1) Location of construction;
(2) Estimated dates on which construction is to begin and be completed;
(3) Length of pipeline; and
(4) Size of pipeline.

The Gas Operator representative handling the construction will be responsible for making this notification.

TOMPKINSVILLE

EMERGENCY PROCEDURES

The Tompkinsville Gas Emergency Procedures Updated July 05, 2012

This plan has been prepared to provide critical information in the event of an emergency. The pipeline safety requirements for an Emergency Plan are contained in the U. S. Department of Transportation, Pipeline Safety Regulations, Code of Federal Regulations 49, 192.615.

It is imperative that those who will have the responsibility of handling an emergency situation be familiar with the contents of this manual. This manual is to be used as an emergency format and does not contain operational data.

Emergency Definition

No emergency plan can anticipate all the conditions to be encountered in an emergency situation. There is no substitute for clear and knowledgeable judgement by the individual(s) involved in the emergency. In any emergency, the public well being shall take precedence.

QUESTION: What is an emergency condition?

ANSWER: An emergency condition exist when qualified representatives have determined and initiate procedures utilizing manpower, equipment, and supplies for the sole purpose of protecting the public from existing and potential hazards associated with natural gas and all facilities thereof:

EMERGENCY PROCEDURES

These procedures are intended to assist in dealing with emergencies involving natural gas customers. The individual representative first on the scene shall assess the situation and obtain all pertinent information in order to determine if a hazardous condition exists.

Gas emergencies are defined as:

1. The continued safe operation of a major segment of the distribution system is endangered, or;

2. a gas leak (ignited or not) is of such magnitude that major roads or highways must be closed, or;

3. a failure or malfunction of the natural gas system exists that.

- Affects a large number of customers or imposes a danger to life and health of such magnitude that mobilization of all available emergency action forces are required, or;
- Necessitates immediate action to prevent or lessen property damage, or save lives.

For emergencies requiring reports to Washington or the State of Kentucky, such reports shall be handled in accordance with **Section: 108** of the Tompkinsville Gas Operating & Maintenance Manual.

Hazards may include, but not be limited to the following:

- **Under-pressurized system**
- **Over-pressurized system**
- **Accidental release of natural gas**
- **Fire or explosion (involving a pipeline facility)**
- **Gas leaks**
- **Damaged pipeline segments**

Conditions that may create an emergency situation:

- **Natural disasters:**
  - **a. Floods**
  - **b. Tornado**
  - **c. Hurricane**
  - **d. Earthquake/settling, heaving and loading**
  - **e. Freezing associated with heaving**
  - **f. Civil disturbance**

Key actions involving a natural disaster:

A. Notify the Fire Department and advise them of the situation at the disaster site.

B. Notify the Police Department and advise as to the areas affected and the help needed from law enforcement.

C. Call for ambulances if they are needed.

D. Notify emergency response agencies (Civil Defense, Red Cross, Emergency Management Agency as well as Mutual Assistance Members, etc.) **See the Operating and Maintenance Procedure Manual for detailed procedures/responses:**

> **① Section 108.2 Responding to Gas Leak reports, ② Section 120 Emergency Procedures, ③ Section 121 General, ④ Section 124 Transmission/Distribution System Failure or Emergency, and ⑤ Other Mission Responsibilities.**

E. If gas is escaping, extinguish all open flames, prohibit access to the area with potential ignition sources and class the area as a "**HOT ZONE.**"

F. Check the surrounding area to ensure venting or migrating gas does not enter surrounding structures.

G. Notify supervision and responding personnel as to the steps needed for corrective action at the disaster site. The responding personnel shall remain in charge until relieved of that responsibility. Actions needed until relieved of responsibility:

> a. Set up communications with Emergency Response agencies.
> b. Coordinate the emergency action at the site.
> c. Secure shut down of all isolation valves in the affected area. Communicate corrective action to all responding personnel.

H. If access to the affected area is difficult or time intensive, the responding personnel shall seek out key isolation valves for the area and shut down gas to the area. Supervision should as well be notified so as to lower the pressure in the area prior to shut down of key valves. This action will reduce the time it takes for the system pressure to blow down (minimize purging and/or burning of gas in the area.)

EMERGENCY EQUIPMENT/LOCATION

Equipment and supplies will be at the disposal of all responding emergency personnel. There shall one location for the purpose of equipment and supply usage in an emergency situation. That location shall be the Tompkinsville Maintenance Shop. Emergency equipment shall be kept on the services trucks at all times to address emergency concerns. All operating personnel shall know the location and proper use of all emergency equipment. Periodic checks of emergency equipment should be performed and recorded. These inspections should be kept on file (hard copy or database).

EMERGENCY EQUIPMENT TO BE UTILIZED	
Gas Maps	Valve Wrenches (6-Keys)
Pipe Wrenches	Ancil Fire Extinguishers
Repair material (clamps/couplings/valves/meters)	Pipe (steel/plastic)
CGI/MSA/EGD	Small tools
Personal Protective Equipment	Radio/cell phone/pager
2002/310 SG 4x4 Backhoe	2000 50 HP Trencher
1992 ½ Ton Pickup	Heath Odorator
1998 Chevrolet Dump truck	Heath LS 800 Locating System (Locator)
1998 3/4 Ton Pickup	

KEYS

Gas Personnel are issued keys to all Tompkinsville Gas locks in the system. All responding personnel shall be equipped to cut any lock not operational. Keys to the system shall be kept in the Maintenance Shop.

VALVE OPERATION

The operation of any valve in the distribution system should be carefully weighed before shut-off or turning-on any valve. The effects of operating a valve on the system should be based on the potential hazard to the public. All such operations shall be cleared through the Gas Operator. *Only authorized personnel shall operate gas valves on the gas system.* All other individuals such as contractors, fire dept, police dept or any other officials are not authorized to operate or instruct others to operate a gas valve on any gas distribution system.

LOCATION OF VALVES

System maps and schematics showing all gas distribution valves in the system shall be kept in the Gas Operators office. All authorized personnel shall be familiar with the location of the valves in the system (primary and secondary valve locations.)

EMERGENCY MANPOWER, ASSISTANCE/AGENCIES

Additional manpower, equipment and supplies may be obtained through the **Emergency Management Agency/Red Cross/Civil Defense and neighboring Gas Operators.**

Other agencies may be called upon to assist in the event of a prolonged emergency:

- Neighboring Natural Gas System
- Emergency Management Agency
- American Red Cross
- Civil Defense
- FEMA (Federal Emergency Management Agency)(Emergency Response Group)

RESPONDING TO REPORTED GAS LEAK

GAS LEAK INSIDE/MAKE SAFE

1. Log time call received and time of arrival.

2. Check for gas when you enter the building structure by smelling the atmosphere and by sampling the open atmosphere by using a Combustible Gas Indicator/CGI.

3. If gas in open atmosphere has registered on the CGI tester or if in your judgment it is necessary to evacuate the building, instruct all occupants to leave building and instruct them not to operate switches, strike matches, or smoke as they leave. ***NOTE:*** Advise occupants to move away from the building, at least past a second structure but not less than 200 feet away.

4. Terminate all open flames.

5. Ventilate the structure as you exit (open doors, windows in the existing area.)

6. Terminate the gas to the building structure by cutting the meter off as quickly as possible.

7. Barhole and test along the building foundation wall to the gas service and out to the gas main. If the service is leaking causing gas to enter the building from underground, call a crew to cut off the service valve or cut it at the tapping tee. Be sure to stand by until assistance arrives. Keep on lookers away until assistance arrives.

7. If leak is inside, after building has aired out and you have rechecked and determined it is safe to return, you may let the occupants return to the building.

8. Make visual inspection of fuel lines and equipment to ensure safe operation. Cut off equipment valves both pilot and main burner and test fuel lines for leaks by performing a decay test (tightness test, close-in, pressure test, etc).

9. If gas is escaping so fast, it is unsafe to leave on while checking for the leak, cut off meter and red seal it and use air pressure to find and repair leakage on the fuel line.

See: Natural Gas Leak Response Procedures/Detailed in Exact Procedures For Troubleshooting Odor Calls.

EXACT PROCEDURES FOR TROUBLESHOOTING ODOR CALLS

(1) **A.** A service department representative will respond upon notification.
B. Document the date and time of notification.
C. Document the date and time of arrival on the scene.
D. Document the time of departure.

(2) Use your own judgment when to run emergency traffic (customer's description of the situation, heavy traffic, etc.).

(3) Indoor odors take priority over broken lines.

(4) Evaluate the scene as you approach. (Observe sight, smell, environment, etc).

(5) Do not park in front of the odor address; check for leak signs as you approach the address.

(6) Turn on and zero GasTrac & CGI/CO (carbon monoxide) detector in clean air.

(7) Place your thumb over the end of the CGI for approximately 5 seconds and make sure it shows pump flow blocked.

(8) Check all around the door for gas or carbon monoxide, especially check high if natural gas and low if propane.

(9) DO NOT RING DOOR BELL - ALWAYS KNOCK. If no one is there, the meter/tank must be turned off. Check the exterior of the building for gas (see outdoor odor sheet). The building cannot be entered without the customer, maintenance, office worker, etc. is on the scene. The gas cannot be turned back on until the inside of the building is checked. (Zero detection)

(10) If less than 1 % natural or less than .5% propane is found inside, see step 18. If carbon monoxide is found, see carbon monoxide sheet.

(11) If 1 % natural or .5% propane, or higher, is found, evacuate the people immediately.

(12) Leave the door you exit by open to help with ventilation.(Do not open more than one opening.)

(13) Turn the meter /tank off as you evacuate.

(14) Call for added help. (You will need it.)

(15) Take the evacuated people approximately 200 feet away. (Advise concerns of traffic cautions to all).

(16) Evacuate buildings next to the odor address. Check for gas with CGI as you evacuate. Also turn off meter.

(17) Check outside for gas at the odor address (see outdoor odor sheet) and periodically monitor reading at the door until it has dropped below 1 % natural or .5% propane. The building may be checked out at this time.

(18) Turn off the valves at each appliance.

(19) Turn the meter /tank back on if it is off and listen for heavy usage. Clock the meter. The 1/4 or 1/2 foot hand must be in the up swing position to clock it. If no heavy usage is found, the piping and appliances may be checked.

(20) Always check piping with the electronic gas detector before using soap. The soap will cause the EGD to sound an alarm.

(21) When checking, consider: (Marked areas checked) baseboard, ceilings, joints, drains, gas appliances, gas plumbing, and outside exterior of building.

(22) If the leak is found and can be stopped by tightening a union or flare fitting, etc., follow company policy as to repairs. When repairs are made, then soap test.

(23) THE LEAK MUST BE STOPPED. If it cannot be stopped, it must be valved off and the valve RED TAGGED.

(24) If the valve is accessible by the public (in a rental cabin, motel room, etc., the line must be disconnected and if possible plugged or capped.

(25) If the leak cannot be valved off, the meter MUST be locked off or the tank regulator pulled.

(26) A pressure test must be seen and documented by the representative of the gas department before the gas service can be turned back on.

(27) If the leak cannot be found indoor or outdoor, **notify the Gas Operator.**

(29) **A.** If nothing is found, be sure equipment has been fired and checked.
B. AL WAYS fill out a report regardless of what is or is not found. Always turn in report to the service department. GET THE ADDRESS AND METER NUMBER OF ANY METER TURNED OFF.

EGD read CO (Carbon Monoxide) in PPM (parts per million)

* If call comes in as a CO (Carbon Monoxide) call, also check for gas indoor and outdoor around the exterior of the building.
* Check around the gas appliance while it is fired.
* Check the heat / air registers.
* Fire all the equipment at the same time if possible.

(1) 0 - 9 PPM Acceptable levels.

If source can be found, write on odor report indicating levels and the appliance. Also, note on report that levels are acceptable. Fill out report regardless of level found.

(2) 10 - 35 PPM give symptoms chart.

(A) Acceptable in restaurants, factories, garages, etc..... where exposure is only for 8 hour periods. Fill out Odor Report. If source can be found, indicate which appliance on the report card and that levels are acceptable. If problem can be corrected, do so and indicate correction on report.

(B) Unacceptable in homes, rental cabins, motel rooms, etc. Attempt to find source of problem. If source is found and can be corrected, do so. If the problem cannot be corrected, the appliance must be valved off and red tagged. If the valve is accessible by the public (rental cabin, motel room, etc.) the line must be disconnected and the valve capped or plugged. Fill out Odor Report listing the levels and the appliance found to be the source.

(C) If the source cannot be found, contact the service department. List the levels found on the Odor Report Form.

(3) 36 - 100 PPM give symptoms chart. UNACCEPTABLE UNDER ANY CONDITIONS.

(A) If in a home, cabin, motel room, etc., suggest occupants evacuate room or building. Ventilate room or building and attempt to find source of problem. Source must be corrected or stopped. If not corrected, the appliance must be valved off and red tagged If valve is accessible to the public (in motel room, rental cabin, etc.), the line must be disconnected and the valve capped or plugged. If the source cannot be found, contact the service department

(B) If in a business, ventilate the room or building. Attempt to find the source of the problem. Correct or stop the problem. If problem is found, valve off appliance and red tag appliance. If problem cannot be found within 15 minutes, call service department

(4) 101 to 200 PPM give symptom chart.

(A) Call service department and evacuate room or building. Do NOT stay in room or building with a reading above 100PPM for more than a couple of minutes without an air pack. Ventilate room or building if possible. If unable to ventilate, call fire department for help. If occupants refuse to evacuate, contact fire department **EVACUATE IMMEDIATELY**!

(5) Above 200PPM give symptoms chart.

EVACUATE IMMEDIATELY. Call personnel in order to the Emergency Call List. Shut gas off outside. Call fire department. Attempt to ventilate room or building. **DO NOT** enter structure without air pack (SCBA) until level drops below 100 PPM. (Recommended level of evacuation is 50 PPM and greater.)

(6) Above 11, 500 PPM is nearing the LEL of CO. Do not enter. (Highly explosive.)

Carbon Monoxide is explosive and deadly, death may occur within 3 minutes at or above this level. Levels detected this high shall require the Fire Department being alerted to investigate possible victims located within the enclosure. **AT NO TIME SHALL AN EMPLOYEE ENTER THE ENCLOSURE WITHOUT REDUCING THE LEVELS INSIDE THE ENCLOSURE. CUT THE METER OFF TO ELIMINATE THE POSSIBLE CREATION OF THE CARBON MONOXIDE THROUGH GAS FIRED EQUIPMENT!!!!!!!!!!!**

LEAK OUTSIDE BUILDING

1. Log time call received and time of arrival.
2. Assess the danger to the public in surrounding buildings. (occupants and property).
3. Extinguish all open flames. No smoking.
4. If necessary, notify fire and police and obtain their assistance.
5. Block the street if the magnitude of the leak warrants. **NOTE:** If a major thoroughfare has been blocked off and traffic re-routed, notification shall be made to Washington.
6. Notify Supervision or other responsible persons.
7. Bar hole next to the foundation of the building and along the service line out to the gas main.
8. Check neighboring buildings for gas.
9. Implement Check List for major emergency.
10. Repair leak.
11. If the structure is safe, occupants may be returned to the structure.

NOTE: If you arrive on a leak call and cannot detect gas or it seems to be coming and go in the air, it is advisable to check for faulty appliances which may be in other buildings or on the roof allowing atmospheric release of natural gas to your location. At anytime you need assistance call for assistance from other qualified personnel.

LEAK OUTSIDE ON GAS METER

1. Log time call received and time of arrival.

2. Upon arrival, check to see if gas is venting freely to the atmosphere and of no danger to life, property or personnel.

3. If gas is detected inside a building (Follow procedures established in the **Tompkinsville Gas Operations & Maintenance Manual, Section 108.22, and also in the document identified as "Gas Leaks Inside" and "Natural Gas Leak Response Procedures".**

   A. Caution occupants not to operate switches or smoke and evacuate the building being sure people are kept a safe distance away;

   B. Shut off gas meter or service valve;

   C. Ventilate building by opening doors and windows.

4. If gas is not entering the building, check for gas leak and repair. Call for assistance as needed.

5. Barhole service and main whenever you are checking for leakage. If leaking, call for a crew and stand by until the crew arrives.

6. After the repairs have been made, restore gas pressure to the meter by using an approved pressure testing procedure if the meter or service had been cut off. If the building has been evacuated, allow people to re-enter when it has been made safe.

GAS OUTAGE/LOSS OF GAS PRESSURE

An interruption to a gas supply line could be due to: freezing of the regulators, or regulator vent lines, or a break in the line, sabotage or supplier cut off. Call your supplier (transmission company.) Locate leak and inform supplier of the location of leak, if possible. Close appropriate valve or valves in your system to isolate the break (if necessary.) Implement Check List for major emergency.

1. Determine as soon as possible how many areas of the plant are affected.
2. Call for assistance as needed.
3. It is imperative that all affected buildings be cut off at the gas riser valve or service valve before pressure can be restored.
4. Any gas meter that can not be cut off by standard means must be dug up at the service valve or the service tee and cut by off.
5. When all services are off, notify Supervision or the highest ranking personnel in charge that all service have successfully been cut off.
6. When advised to turn on and relighted, use **"Restoration of Gas Service Turn On and Test Out Procedures" located in this manual.**

RELIEF VALVE BLOWING

1. Be sure to record the time call was received and time of arrival.

2. Make sure that gas is not entering the building and poses no danger to the public.

   A. If you feel there is an immediate danger, than close inlet the valve to meter center.

   B. Make necessary repairs and arrangements to restore service to the plant equipment.

3. If there is no danger, then put a pressure gauge on the line and operate the by-pass so that pressure on the system will return to normal.

4. Call for necessary help to make repairs.

5. When repairs are made, put regulator back in service and check to make sure everything is operating properly.

NOTE: Never cut off a relief valve where a fuel line or appliances could be over-pressured. Always leave the shut-off valve ahead of the relief valve locked and in the open position.

FIRE AND OR EXPLOSION

Any report of an explosion or fire must be considered an emergency. Prompt arrival and assessment and evaluation of the situation dictates the procedure as all situations will probably differ. The safe resolution of each emergency will depend on the judgment and experience of trained personnel on the site.

In all instances, it must be assumed, until proven otherwise, leaking gas caused the emergency and all precautions taken to alleviate the problem and all buildings in the vicinity checked in the surrounding area.

1. Upon arrival, contact the fire, police and other officials on scene to obtain information concerning the probable cause, origin and limits of the fire or explosion.

2. Be prepared to shut off the gas service to the damaged building(s) by cutting the meter off or closing the service valve. If neither is available, have the service cut at the tap. If is necessary to operate a main line valve, clearance must be obtained from the Gas System Operator.

3. Check to see if gas is in any of the nearby buildings by using a Combustible Gas Indicator and sense of smell. If a gas leak is detected, use proper leak procedures as outlined.

4. Barhole service and main around the affected area to see if there is any leakage.

5. Call for help from if needed.

6. If minor damage is done, disconnect all damaged appliances or piping and test fuel lines with a pressure test before turning on and checking the pressure on the line.

NOTE: If the fire is at an appliance, shut off the gas at the appliance valve if possible. If it is not possible to the shut the gas off at the appliance valve, then shut off the gas at the meter center or high pressure wingcock. Isolate the hazard.

RESTORATION OF GAS SERVICE, TURN ON AND TEST OUT

TURN ON AND TEST OUT

In turning gas service on to a consumer all gas piping and meters must be purged and appliances relighted. Never turn on gas to a meter or riser valve unless you have access to all appliances on the downstream piping. The person in charge is to coordinate this operation and be responsible for the operation. A complete record of the incident, with drawings, etc., must be kept on file.

Turn On and Test Out Procedures:
Timing:

1. Make a visual inspection of the gas equipment to be tested. Inspect piping, vents, valves, controls and thermostatic controls. This inspection is done to ensure safe operation in the future. **NOTE:** Ensure no open lines exist inside the structure. **NOTE:** Never light new equipment. If new equipment is lighted prior to the installer cycling the gas equipment and filling out the warranty card and submitting the information to the manufacture, then that individual or company representative accepts the responsibility of the warranty.

2. Shut off all valves to the gas equipment, if there is no valve present, then cap or plug fuel line in order to perform an accurate test.

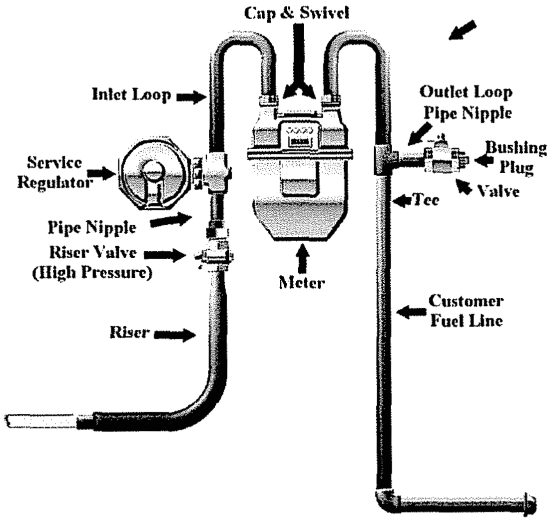
3. Loosen the outlet plug at the meter center and verify the index is registering (working.) Once assured the meter is registering, replace the plug, turn the riser valve (high pressure) **"ON"** and observe the test. The following time intervals shall be observed for each specific test hand:

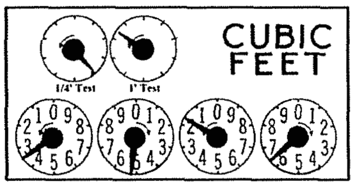
   A. 1/4 foot test hand, observe for 3 minutes

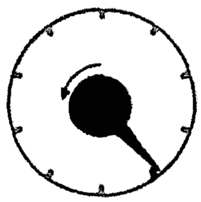
   B. ½ foot test hand, observe for 5 minutes

   C. 1 foot test hand, observe for 8 minutes

   D. 2 foot test hand, observe for 12 minutes







1/4' Test Hand

NOTE: See "Timing Tables." Timing tables will allow you to calculate how much gas is passing through the meter.

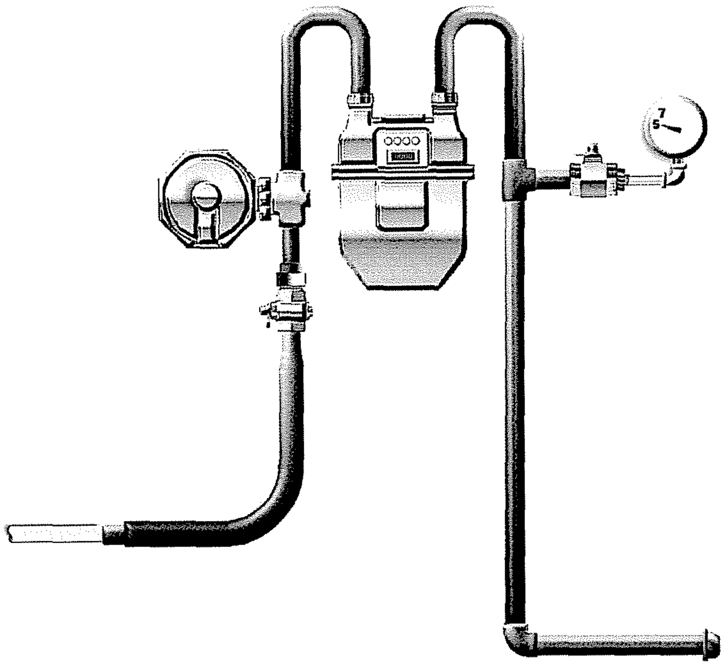
4. When performing a **"Time Test"** (timing the meter by the index)(use the smallest incremental test hand) always make sure the test hand is in the 7 o'clock up-swing position. This will allow for an accurate time test.
5. Always turn the gas meter valve on slowly while observing the test hand. If the test hand starts to spin rapidly, turn the valve off quickly. This indicates a server leak on the gas line, potentially causing a hazard inside the structure. **NOTE:** If the leak can not be traced down, the valve at the gas meter shall be closed and locked until a time when the fuel lines can be tested with air or an inert gas. This action will eliminate a hazard to the public and property.
7. If no movement is observed during the timing test, the meter can left in the **"ON"** position and only if there is someone present at the structure to receive verification of the gas being turned on to all equipment. A responsible party must receive notice of the gas being turned on. No minors may ever receive this notice. If there are questions as to the age of the person receiving the gas notice, then a drivers license issued by the state of residence must be presented. **NOTE:** At this point, legally the state has recognized this person as a responsible adult. If no one is present to receive notice of the gas being turned on, then the meter valve must be turned to the off position and a lock or locking device must be placed on the valve. **NOTE:** Leave a card on the door for the responsible party to call the utility for testing and to receiving the gas to the structure.

Turn On and Test Out Procedures:
Pressure Testing:

1. A gauge must be place on the downstream side of gas meter. The gauge must be a gauge design to register 1 psig or less. The regulator shall be set to deliver 7" of Water Column (.25 psig or expressed as 1/4 psig) to the customer. Most gauges possess dual scales such as "Inches Water Column and Ounces." If using the scale of ounces, the regulator shall be set at 4 oz. Pressure delivery to the customer. **See pressures:**

INCHES OF WATER COLUMN	OUNCES
28" W.C. equals 1 pound per square inch gauge. A residential gas meter can only register (7" WC/.25 psig) delivery and record it on the meter index. Any pressure greater than .25 psig is not recorded on the index (super compressibility.) **Example: Price of gas metered (Base Pressure)** 14.65 Atmospheric Pressure <u>.25</u>pounds per square inch gauge (psig) **14.90 pounds per square inch absolute (psia)** 14.90 psia (Base Pressure) If a meter records 1000 cfh @ 7" W.C. (.25 psig) **7" WC (.25 psig)** $\frac{14.90 \times 1000 \text{ cfh}}{14.90 \text{ (Base Pressure)}} = \frac{14{,}900}{14.90} = 1000$ **cfh** If a meter records 1000 cfh @ 10" W.C. (.35 psig) **10" WC (.35 psig)** $\frac{15.00 \times 1000 \text{ cfh}}{14.90 \text{ (Base Pressure)}} = \frac{15{,}000}{14.90} = 1006.7$ **cfh** Any pressure delivery over 7" WC is not recorded and never recovered. A loss to the utility.	16 Ounces equals 1 pound per square inch gauge. A regulator must be set at .25 psig delivery to the gas meter to accurately record the volume used. If the service tech is using the Inches Water Column scale, then 7" WC will be .25 psig. If using Ounces scale, then 4 oz will be .25 psig. The conversion factor from inches to ounces and vise-versa is (1.75) **4 oz x 1.75 = 7" WC** **7" WC ÷ 1.75 = 4oz**

2. With the gauge placed on the downstream side of the gas meter. After checking to ensure all the piping (customers fuel line) is connected to the gas equipment and the valves at the gas equipment are in the **"OFF"** position, then cut the high pressure riser valve off. At this point you are testing the system for decay of the pressure. If the pressure drops on the gauge then you have a leak on the piping system. **NOTE:** If you have a high pressure riser valve that is leaking through, it will pack the nipple between the outlet side of the high pressure riser valve and the inlet side of the regulator with high pressure. This may mask a gas leak on the system. However, if after shutting off the high pressure riser valve for the pressure test, you then lower the pressure in the pipe to a value less than the regulator delivery pressure and you will be executing a legal pressure drop test. **Example:** If we have the regulator set to deliver 7" WC and after shutting the riser valve off, we then lower the pressure in the system to say, 5" WC, and the pressure rises back up to 7"WC, it would mean the high pressure riser valve is bleeding through. If the pressure drops from the 5" WC to less than the 5" WC, it means there's a leak on the piping system, and if the pressure on the gauge holds steady at the 5" WC, it means the test is good and therefore accurate.



3. If no leaks have been detected, the next step will be to perform proper purging procedures to expel all air from the fuel lines and provide a 100% gas rich environment in the fuel lines. If the fuel line is greater than 2 ½" then follow **Table III from the NFPA 54 ANSI Z223.1 "Purging of Gas Piping".**

TABLE III

LENGTH OF GAS LINE REQUIRING PURGING WITH AN INERT ATMOSPHERE

Nominal Pipe Size, Inches	Min. Length of Piping Requiring Purging
2 ½	50 feet
3	30 feet
4	15 feet
6	10 feet
8 or larger	any length

7. After safely purging the piping and the environment is safe, the relighting may take place.

NOTE: If the test to ensure a tight and secure fuel line is performed with a manometer (Water Column) make sure the test is performed accurately by observing the following: **NOTE:** The manometer is a choice by the operator. A burdon tube type gauge is acceptable.

NOTE: If using the water column gauge, then follow the procedures below:

a. Fill the column with water to the zero mark.
b. Make sure hoses have no cracks or holes and are tight.
c. Hook up the manometer to the fuel line.
d. Make sure the manometer is setting or resting in a level position where an accurate reading can be observed.
e. Open the gas valve on the meter slowly so as not to blow the water from the column tube.
f. Once the fuel line has pressurized to the regulator set pressure then close the gas meter valve off and observe the manometer. If the manometer shows no leak the gas representative may then perform lighting procedures.

TIMING TABLES

900xRev	1/4 foot test hand	1800xRev	½ foot test hand
900 X .1	90 ÷ Time = CFH	1800 x .1	180 ÷ Time = CFH
900 X .2	180 ÷ Time = CFH	1800 x .2	360 ÷ Time = CFH
900 X .3	270 ÷ Time = CFH	1800 x .3	540 ÷ Time = CFH
900 X .4	360 ÷ Time = CFH	1800 x .4	720 ÷ Time = CFH
900 X 1.0	900 ÷ Time = CFH	1800 x 1.0	1800 ÷ Time = CFH
3600xRev	**1 foot test hand**	**7200xRev**	**2 foot test hand**
3600 x .1	360 ÷ Time = CFH	7200 x .1	720 ÷ Time = CFH
3600 x .2	720 ÷ Time = CFH	7200 x .2	1440 ÷ Time = CFH
3600 x .3	1080 ÷ Time = CFH	7200 x .3	2160 ÷ Time = CFH
3600 x .4	1440 ÷ Time = CFH	7200 x .4	2880 ÷ Time = CFH
3600 x 1.0	3600 ÷ Time = CFH	7200 x 1.0	7200 ÷ Time = CFH

NOTE: There are 10 increments on a test hand dial (1/4 foot or ½ foot) if the hand moves from one increment to the next, it has moved 1/10th (.1). Example: If you have observed the hand move (.1)(1/10th) on a 1/4 foot test hand in a 30 second time span, you would then use the table (900xRev)(1/4 foot test hand).

90 ÷ 30 seconds= 3 cubic feet per hour movement

EQUIPMENT INSPECTION AND LIGHTING

1. Visually inspect equipment
   A. Vent system
   B. Wiring
   C. Burner condition
   D. Combustion chamber
   E. Filter
   F. Fan compartment door
   G. Check the fan & limit settings (fan on 130 degrees, fan off 110 degrees and limit should be set 175-180 degrees)

2. Turn control valve off

3. Turn thermostat to call for heat.

4. Turn control valve to "on" to check safety.

5. If safety is ok, turn control valve to pilot position and light pilot.

6. If pilot safety holds, slowly turn on control valve to ignite burners.

7. Visually check flame condition before fan comes on.

8. Check draft at diverter.

9. Visually check flame condition after fan comes on.

   NOTE: In the event that a hole or crack in the combustion chamber is suspected or detected, the registers should be closed down to pressurize the duct system and the burner flame observed for excess air movement inside the chamber. If a problem is indicated, the equipment will be rendered inoperative, tagged and the customer referred to a licensed contractor for a complete visual inspection of the combustion chamber.

10. Turn down thermostat setting till main burners are extinguished.

11. Turn thermostat setting up and check ignition of main burner under normal operating condition.

12. Lower thermostat setting and allow fan to cycle normally.

13. Notify customer of any repairs or maintenance required.

PROCEDURES FOR FURNACE INSPECTIONS

Listed below are samples of the different types of furnaces. Each furnace has different procedure for inspecting, lighting and adjusting.

Wall Furnace

Always make a visual inspection of a wall furnace, checking for fire hazards. Make sure the furnace is free from lint and any other combustible materials. If for any reason, you find the wall furnace unsafe disconnect cap and plug off the fuel line to the furnace. If you are unable to disconnect the fuel line loosen the thermocouple. If the unit is a double furnace, check both sides for fire hazards and make sure that no return air for a wall furnace is drawn from bath room or kitchen. Make sure gas is cut off to wall furnace and no odor of gas is present. Check burner venture and pilot for lint and other combustible materials. Check heat exchanger for cracks, burn outs and proper alignment. Always light pilot with the burner in the off position. After proving pilot is lit, turn up the thermostat to call for heat and turn on the burner valve. Observe the gas input on the burner, if in doubt , get B. T. U. rating off name plate and time meter. Make any necessary adjustments by setting appliance regulator to the wall furnace. After a wall furnace has been burning for a couple of minutes check at the draft hood by holding a lighted match around the entire opening of the draft diverter. When checking draft and vent on the wall furnace, make sure the top of heat exchanger and diverter are secured properly. Do **not** light if the wall furnace is dirty or in need of repairs. If the wall furnace is left off, leave a list of needed repairs or services with the customer.

Circulator

Always make a visual inspection of the circulator, checking for fire hazards. If for any reason, you find, the circulator is unsafe, disconnect. Remember to make sure the circulator is located so it will not cause a fire hazard to walls, curtains, furniture, doors when operating. Make sure that the circulator is free of lint and any other combustible materials. If the circulator is equipped with a heat exchanger, check for burn outs and cracks. If no gas odor is present, light the pilot with the burner in the off position. After proving safety, if the unit is so equipped, turn on burner and make visual check for complete combustion and proper rating. Check house pressure and check B. T. U. by timing gas meter, set in put if necessary. Check diverter for draft with a lighted match, check vent for proper installation and rust or holes. If circulator has radiant check to make sure they are properly placed. If circulator is left off, leave a list of needed repairs or services with the customer.

Space Heater

Always make a visual inspection of the space heater, checking for a fire hazard. If for any reason, you find the space heater unsafe disconnect. Remember to make sure that it is located so that it will not cause a fire hazard to walls, curtains, furniture, or doors when operating. A space heater incorporates no venting arrangements because of its construction. The unit will discharge all combustion products through the combustion area into the room that is being heated. Check to make sure that the burner is not overrated with gas and adjust if needed. The proper adjustment is made by starting with a soft yellow tipped flame and increasing primary air until the inner cone can be distinctly seen. Always make certain primary air adjustment is secured in position and house pressure is set properly. If a space heater is left off, leave a list of needed repairs or services with the customer.

Force Air Furnace

When a furnace is located in the attic make sure, the stairway or passageway to a furnace is safe and well lit. If the furnace is located in closet or furnace room check for adequate supply of oxygen for complete combustion and ventilation. Always make a visual inspection of the furnace, checking for fire hazards. If for any reason, you find the furnace is unsafe, disconnect. Check to see if pilot light is on and burning properly. Then check to see if the furnace electric circuit is energized. Also check the secondary side of the transformer, disconnect one lead and use tattle lite to trace out low voltage. Never short on the secondary circuits this might cause the heat anticipator in the thermostat to burn out. If an electric circuit is complete and safe, check for proper operation. When a gas valve is equipped with a bleed, check bleed for proper operation. When a main burner comes on check flame characteristics and ignition, make necessary adjustments. Check all protective devices on furnace for safety and to assure proper operation. Make certain the filter and the fan blower is clear and all doors put back in place. Observe heat exchanger for possible air leakage after the furnace has heated up enough to bring the fan on (you need to be watching the flames as the fan comes on, this way you will not miss a change in the flames) If the heat exchanger has a leak, the burner flame will be distorted. Check furnace vent and relief opening of the draft hood to make sure all products of combustion are going up the chimney. If a furnace is left off, leave a list of needed repairs or services with the customer.

Warm Air Furnace

When a furnace is located in the basement make sure, the stairway is safe and well lit. Be careful going down basement steps and approaching furnace. Always make a visual inspection of the furnace, checking for fire hazards. If for any reason, you find, the furnace is unsafe, disconnect. Check furnace pilot light to see if it is burning properly. If the pilot light is out and furnace is not equipped with a 100% safety, leave the furnace door open until all gas odor has dissipated. Observe condition of fire box, heat exchanger and baffles. When equipped with baffles and they are not in proper positions, rearrange them. Relight pilot and check electric circuits to the furnace, if primary circuit is energized, check secondary circuits to prove electric circuit. When furnace burner comes on check for proper combustion and ignition of gas, then make any adjustments if needed. Check all protective devices on furnace for safety and proper operation. Since this type of furnace depends upon gravity to circulate warm air, make certain all return air ducts are unrestricted. If the furnace is equipped with filters, make sure the filters are clean. Check for proper openings for combustion air, vent and relief openings of draft hood. Remember to make sure that all products of combustion are going up the chimney. If the furnace is left off, leave a list of needed repairs or services with the customer.

NATURAL GAS LEAKS RESPONSE PROCEDURES	
RECEIVE LEAK CALL FROM: Dispatcher	**TIME RECEIVE**
CORRECT ADDRESS	**TIME ARRIVED**

Street Name: Road, Drive, Lane, Cove, Private Drive
Map book address at the top of page indicate E & W
Map book address on left side of page indicate N & S
Ask for closest cross street or intersection
If can not find address, call dispatcher/control room for tap location

NATURE OF CALL

Ask any necessary questions to understand type of leak
- Location of leak
- Location of leak in relation to building; 0N, 0E
- Location of meter; 0S, 0W

Where did leak report originate?
- Customer call in
- Customer Service
- Unit number
- Contractor
- Passer-by
- Leak Survey
- Fire/Police Department

Is leak inside or outside?
Is leak cut and blowing?

EMPLOYEE SIGNATURE

Be sure to use the correct work request number
Use date leak issued
Record your crew number
Record all critically legal information/times being most critical in responding to emergencies

EMPLOYEE IN CHARGE OF RESPONDING CREW SIGNATURE FORM

Foreman
Crew Leader

OBSERVE THE AREA AND ASSESS THE SITUATION AND DEVELOP A PLAN OF ACTION

What do you see as you approach the job site
- Park up-wind if gas blowing
- Smell an odor of gas
- See the vapors or the refraction of light or (fumes)
- Construction in the area
- Call for emergency locate

Arrival at the scene

- Access to all required PPE
- Hard Hat
- Safety glasses
- Safety goggles
- Work gloves
- Hearing protection
- Flame retardant clothing

Follow established Safety guidelines

- Set up job site. All crew members should be able to do this
- Do not get in hole with blowing gas from PE pipe
- In a gaseous atmosphere use supplied air
- Dig separate bell hole if necessary to squeeze PE / valve off
- Use static solution when applicable with PE
- Use grounding wire when cutting steel with trace of gas

WHO IS AT THE JOB SITE?

CUSTOMER SERVICE ❑ LEAK SURVEY ❑ FIRE DEPT ❑ POLICE ❑ OTHER

Establish communication

- Customer or Occupant
- Customer Service
- Leak survey
- Fire dept.
- Police dept.

Emergency Management Association. Use the H. E. L. P. process

- **Hazard** .... **Is there a hazard**
- **Extent** .... **What is the extent (of hazard)**
- **Life** .... **Take action to protect life first**
- **Property** .... **Protect property second**

Is large amounts of gas present?
Establish perimeter to keep everyone out
Evacuate if necessary, move people far enough away from danger area
Keep the public out of the area
Keep media back out of the area

COMBUSTIBLE GAS INDICATOR, CLEAR & ZERO IN A GAS FREE ATMOSPHERE

- Visually inspect CGI
- Calibration date current on equipment. Legal issues. Calibrate on scheduled dates.
- Leak test, hold finger over end of probe and squeeze bulb. **If aspirator type.**
- Bulb should remain deflated for 30 seconds.
- Check batteries, needle movement, gauge
- Cracks in hosing material
- Physical damage
- Zero both LEL and UEL or %GAS scale

  Turn switch clockwise until meter is zeroed on the LEL scale. Switch to % Gas and zero using zero adjustment (ZA) screw if applicable. If voltage is low the instrument will not zero.
- Know the condition of your cotton filter
- Purge CGI in a gas free atmosphere, squeeze bulb 7-8 times
- **Inside leaks start on LEL scale**

- Underground leaks start on UEL or Gas scale 100%
- Crew member get bar rod and other tool from truck
- Lower Explosive Level, 5% scale
    1. **Scale 1-100, 20% LEL = 1% Gas in air**
    2. **Scale 1-100, 40% LEL = 2% Gas in air**
    3. **Scale 1-100, 60% LEL = 3% Gas in air**
    4. **Scale 1-100, 80% LEL = 4% Gas in air**
    5. **Scale 1-100, 100% LEL = 5% Gas in air**
    6. **5% GAS = 100% off scale**

- Upper Explosive Level, GAS scale

  Registers % of Gas in air
  Measures from 1% to 100% Gas in air mixture
  Use sustained reading, 10-12 pumps and until needle stabilizes
  Record your findings or readings
  Never use any EGD instrument that doesn't record CH_4 in the place of the CGI
  Never These: Gas Trac, your nose or someone else's nose
- Purge CGI when the test is complete, do not leave gas in the CGI

NOTIFY OCCUPANT, KNOCK ON DOOR, DO NOT RING DOOR BELL

- Never, ring a door bell, that may be the ignition source.
- Identify yourself as an employee of the utility and state your purpose for being there.
- Be calm and do not get excited.
- If leak is outside inform customer that you may be in there yard

SAMPLE AIR TOWARD THE CEILING WITH YOUR CGI ON LEL SCALE, EYES ON THE CGI

When you take your first several samples, your eyes must be on your CGI because the needle may move very rapidly. If it does you may never see the movement. Natural gas is lighter than air and will rise toward the ceiling. Natural gas specific gravity .60/air 1.0

NO READING ON YOUR CGI INSIDE IN AN OPEN ATMOSPHERE

Ask the customer if and where the odor complaint has been coming from. Never state you smell gas or refer to the problem as a gas. Refer to the problem as an odor. This is done solely so as not to alarm the customer. Remember, you are the gas expert. That's why they called you and not a doctor, lawyer or a candle stick maker.

ANY READING ON YOUR CGI INSIDE IN AN OPEN ATMOSPHERE, EVACUATE

EVACUATE SAFELY?
- Do not operate any electrical switches
- Do not operate any type of telephone nor hang it up
- In a very calm, confident manor evacuate safely if gas is present. You should get everyone out of the building and evacuate the structures on both sides. Locate to a safe distance.
- Establish a safe perimeter and keep the public at a safe distance. Fire and police assistance.

VENTILATE

- Leave open the door that occupants came out.
- Do not enter a structure with gas present to open doors and windows.
- Use a fan/aerator to pull gas away from structure. (Make sure it is incendiary safe)
- You may dig a vent hole between structure and leak.

NOTIFY THE CONTROL ROOM, DISPATCHER, FOREMEN, SUPERVISOR

- Required to notify control/dispatcher if you need to evacuate.
- Notify your Foremen or Supervisor.
- Ask for any additional help from fire or police if necessary.
- Call for additional Customer Service or gas personnel if needed.

ELIMINATE POTENTIAL IGNITION SOURCES

- Shut off gas meter to extinguish open pilot lights.
- Have electric, telephone and cable cut off at a safe distance.
- Eliminate ignition sources to all buildings evacuated.

IDENTIFY IF IMMEDIATE HAZARD EXIST AND/OR EXTENT OF (GAS MIGRATION)

- Determine the extent of the hazard by checking at the foundation on all sides with CGI.
- Determine the possibility of multiple underground gas leaks and the migration of gas into nearby buildings/structures.

NOTE: DO NOT ASSUME THAT ALL GAS BLOWING FROM A DAMAGED GAS LINE IS VENTING TO ATMOSPHERE.

- Check by moving outward in all directions until no gas is detected underground.
- Move all personnel still farther from this area.
- Bar rod and check with CGI over gas services and mains, any potential ditches across the property, manholes, drains or any other access.

ESTABLISH A SAFE PERIMETER

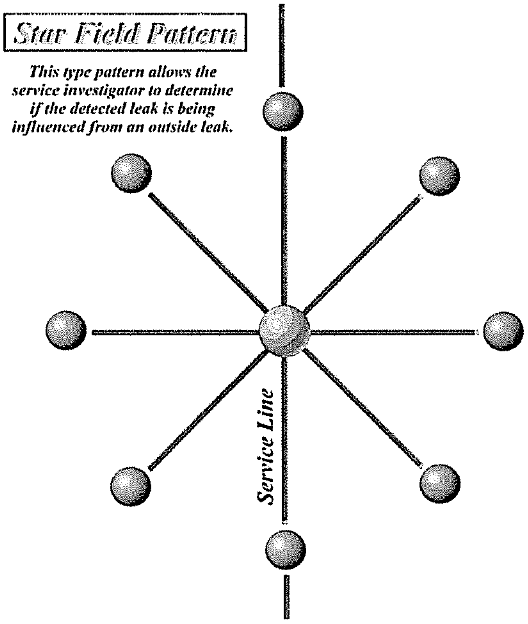
- After determining the extent of the gas migration set up your perimeter.
- Keep all unnecessary personnel out of this area. **(Hot zone) (Cold zone)**
- Let the Police and Fire department maintain these zones

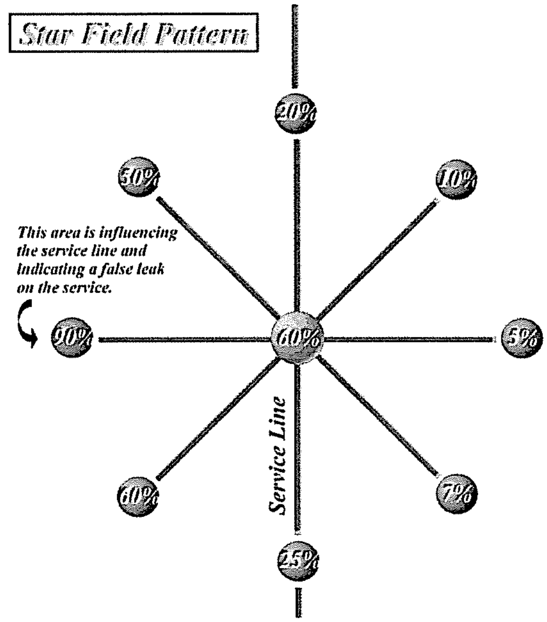
ELIMINATE THE GAS

- Eliminate the gas by use of:
  - **Valves**
  - **Squeeze off tools**
  - **Tapping tees**
  - **Cut & capping**
  - **Purging a section already valved off**
  - **Vent holes**

PINPOINT THE GAS LEAK

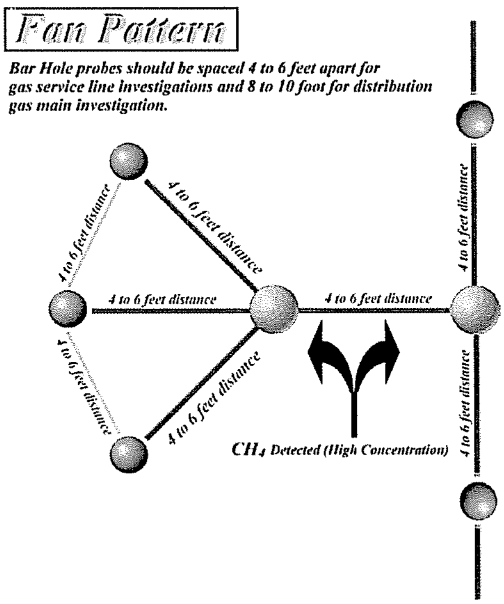
- Determining the outer boundaries of the gas leak will define the area in which the leak must be repaired. **Use pattern (star) and (fan) to pinpoint migrating gas leakage.**





*NOTE: Always conduct a thorough investigation.
Never discontinue the investigation when
the first signs of natural gas are detected.*

REMEMBER: Public safety shall be the overriding first priority. Identification of the leak shall follow all emergency procedures.



- Locate the main and any services or stubs, or other gas lines.
- Locate any other lines in the area.
- Inspect CGI for physical damage.
- Purge CGI in a gas free atmosphere.
- **Take CGI readings in bar holes of equal depth and at the top of the hole as well to ensure you are not below the gas pipe with your bar hole.**
- Pump CGI 7-8 times per hole and use the highest sustained reading. (Only if aspirator bulb is used with the CGI).
- Initial bar holes to be 6' - 10" apart. (10'-20' in some areas of the country).
- Record all initial and sustained readings for each bar hole.
- Highest CGI reading is assumed to be the location of the leak. (May require further tests)
- When all readings are about equal, **test the top of the bar hole** and find the highest reading, usually closest to the leak.
- **Sight-Look** across top of bar hole close to the ground to find escaping fumes. Put dust in hole and note the turbulence of the dust particles.
- **Feel-Place** the back of hand on top of bar hole and feel for slight pressure.
- **Aeration-Purge** the gas from bar holes either over the gas line or away from the gas line.
- Don't purge every bar hole.
- Create a vacuum. You must have a good seal on purger. DO NOT BLOW AIR INTO BAR HOLES. The hole that builds up gas in the shortest time and maintains a steady reading shall be assumed to be nearest the leak.

FACTORS AFFECTING GAS LEAK PATTERNS AND MIGRATION

SOIL TYPE

- Porous soils offer little resistance.
- Clay soil greatly restrict.
- Alluvium soils are sandy and offer less resistance.

PATTERNS

- Small circular patterns.
- More lateral spread, larger and somewhat irregular patterns.
- Large irregular patterns. Forced to follow cracks, fissures and voids.
- State line pressure
- Leak size
- Depth of cover
- Water content of soil
- Compaction of soil
- Underground voids
- Frost, Paved areas. Street, Sidewalk, Parking lot. Driveway,
- Frozen ground
-

EXCAVATE

- Involve the ONE-CALL SYSTEM-811/DAMAGE PREVENTION COORDINATING COUNCIL
- Leave hole open to ventilate.
- If gas leak is not in the first hole, determine from which direction the leak is coming from. REPAIR THE LEAK(S) AND RE-CHECK THE AREA
- Have a manned fire extinguisher when working on a gas leak, taking into consideration wind direction. Always position the fire extinguisher upstream of the wind.
- Repair the leak.
- Re-check the area and don't leave gas in the ground.

ABNORMAL OPERATING CONDITIONS

- Failure to follow established procedures
- Fire on pipeline facility
- Low oxygen atmosphere
- Under Odorized
- A malfunction of operations of the pipeline or any component(s)
- No Gas
- Gas blowing

CHECK LIST (MAJOR EMERGENCY)	
1	Has the Fire Department been called?
2	Have occupants been evacuated and the area blockaded?
3	Has the Police Department been notified?
4	Has the repair crew been notified?
5	Has the company call list been executed?
6	Have communications been established?
7	Has outside help been requested?
8	Have ambulances been called?
9	Has leak been shut off or brought under control?
10	Has Civil Defense been notified?
11	Have emergency valves or proper valves been identified and located in order to shut down or reroute the gas?
12	If an area has been cut off from the supply of gas, has the individual service of each customer been cut off?
13	Is the situation under control and has the possibility of reoccurrence been eliminated?
14	Has the surrounding area, including any buildings adjacent to and across the street been tested for potential leakage?
15	Has the proper tag been place on the meter?
16	Have telephonic reports been made to the state?
17	Have telephonic reports been made to the DOT/RSPA?
18	Has chosen radio station been given instructions (if necessary) ?

HOW CAN YOU PREVENT GAS EMERGENCIES?

1. Keep all appliances clean, properly vented and serviced regularly.

2. Make sure everyone in your family knows how to operate the gas appliances and shut-off valves.

3. Don't use or store gasoline, aerosols or other products with flammable vapors near gas appliances.

4. Don't use an open gas oven for heating your home or drying clothes.

5. If you have gas logs in your fireplace, the damper must be permanently blocked open.

6. Whenever changing your furnace filter be sure to re-install your fan compartment door.

7. Never cover fresh air vents, louvers or fresh air returns that supply air to your gas appliances.

8. Have all gas line alterations and appliance repairs performed by a professional.

9. Before digging in your yard, be sure you know the location of underground gas lines. Call us.

10. Write your fire and police department phone numbers and our emergency service number in the front of your phone book or in a convenient high profile location.

11. Stop by the office for Public Education flyers. Contact your Emergency Management Agency or the office of the Public Service Commission for information as well.

HAZARDS OF NATURAL GAS AND CARBON MONOXIDE

NATURAL GAS HAZARDS:

There are three main concerns in dealing with natural gas;

1. Explosion
2. Fire
3. Asphyxiation

EXPLOSION

The explosion of natural gas can occur when natural gas is confined and allowed to build up in volume. The mixture of natural gas and oxygen has to possess a certain quantity of both.

When natural gas makes up 4.5% of the atmosphere in a confined space, this is called the **Lower Explosive Limit (LEL)** of natural gas. When natural gas makes up 14.5% of the atmosphere in a confined space, this is called the **Upper Explosive Limit (UEL)**. The range from 4.5% gas-to-air to the 14.5% gas-to-air, this is called the **Flammability Range** of natural gas. Between 4.5% to 14.5% natural gas can and will explode. Below 4.5% there is not enough gas for ignition. Above 14.5% there is too much gas for ignition. The ignition temperature for ignition of natural gas is between 1100 to 1200 degrees Fahrenheit. Simple static electricity can ignite natural gas within the Flammability Range.

When entering a building structure with electronic detection equipment, the unit must be cleared and zeroed outside to ensure the operator of receiving an accurate reading upon entering an enclosure. If the operator records a reading on the equipment in open atmosphere, this shall be considered a hazardous environment. Any reading in open atmosphere no matter how small means that there is a higher concentration somewhere else in the structure you have just entered. It may conceivably be in the walls or in the ceiling or underneath the floor entering the building structure. Somewhere between your electronic detection equipment and the concentration of natural gas is the Flammability Range of natural gas just waiting to ignite. This a paramount concern for any life in and around the structure. Emergency Procedures are to be followed upon detection of natural gas in open atmosphere. The Gas Company should be notified immediately upon detection.

FIRE

Once natural gas has ignited and the gas and surrounding materials are burning, caution must be observed during the fire fighting phase. The two primary responses in fighting a natural gas fire are:

1. Terminate the gas supply
2. Address the burning material and not the burning gas

Termination of the gas supply is a must. Termination means cutting the gas off. The first and primary response is to cut off the inlet valve on the riser feeding the meter. Once the valve on the riser has been cut off, the fire will quickly consume the gas inside of the piping system feeding the building structure. Once the feed of gas has been terminated the fire can be safely extinguished. **NOTE: Never put out a blowing gas fire**. It may reignite the gas, causing an explosion inside the structure which may collapse the walls and drop the ceiling. **If the gas is burning, it cannot explode!!!!!** It is being consumed under a controlled burn.

ASPHYXIATION

Natural gas will displace the oxygen in a confined area. As this occurs several things can happen to the occupants of the structure:

1. Prolonged exposure to natural gas will numb the sense of smell to the point where natural gas can no longer be detected. Prolonged exposure can give the occupants a false sense of security. **Example: I don't smell it anymore, it must have gone away.**
2. The occupants of the structure can be overcome by asphyxiation. Fresh air or a breathing apparatus may be a means to revive the occupants.
3. Death can occur by means of asphyxiation.

As responders you should remember gas is displacing the oxygen inside the structure, which means there is a higher concentration of gas in air present. If the level of gas gets above the Upper Explosive Limit (UEL) the gas will not ignite nor burn (to much gas and not enough air). Entering this environment will require a breathing apparatus for long exposures. **NOTE:** If there is a high concentration of natural gas present (above the UEL), caution must be taken when ventilating and terminating the gas supply. If the gas supply is terminated and the enclosure is ventilated, this will bring the level of gas present down to a safe level. **Always remember that as the level of gas comes down, it will go <u>through</u> the Flammability Range of natural gas (4.5% LEL to 14.5% UEL).** This is the point where the gas can be ignited. Extreme caution must be taken during the ventilation and termination phase of correcting this type of problem.

CARBON MONOXIDE HAZARDS

Carbon Monoxide is produced from the incomplete combustion of natural gas. Carbon Monoxide is a physical gas and is to be treated with caution just as you would natural gas. Always remember that carbon monoxide is a by-product of natural gas. The primary concern with carbon monoxide is CO poisoning associated with human life. Like natural gas, CO can create the same hazards. A victim of natural gas exposure can recover without noticeable side effects, but victims from CO poisoning may suffer for the rest of their lives or my never recover. Carbon monoxide if inhaled and absorbed through the lungs into the bloodstream can strangle the victim and cause death. Hemoglobin in the blood is responsible for transporting oxygen to the brain. CO will link with hemoglobin, displacing oxygen and producing a CO poisoning in the body. If the blood oxygen is reduced enough, it can result in unconsciousness, brain damage or death. Symptoms of CO poisoning exhibited in stages are:

EARLY STAGES	
* Flu-like symptoms * Headache, throbbing at the temples *Weakness * Nausea and vomiting * Increased pulse and respiration	* Confusion *Partial loss of muscular control *Tightness across the forehead *Dizziness
MIDDLE STAGES:	
* Conscious, but very confused* Unable to move due to muscular weakness	
FINAL STAGES:	
* Blood pressure falls * Muscular control is lost * Reflexes are dulled	* Intermittent convulsions * Breathing grows shallow until it finally stops

NOTE: Other symptoms that identify CO exposure that may go un-noticed are as follows:

* Sore throat
* Eyes burning
* Nasal passage drying
* Loss of smell associated with Aldehydes in CO

CONCENTRATIONS OF CARBON MONOXIDE IN AIR

FACTORS THAT AFFECT THE AMOUNT OF CARBON MONOXIDE ABSORBED:

* CO concentration in the air.

* Length of exposure (In some cases long exposure to smaller levels of CO can produce severe symptoms that are normally associated with higher levels of Carbon Monoxide).

* Number and length of periods of breathing fresh air between exposure.

* The degree of physical activity; the greater the rate of respiration the more CO will be inhaled.

* Physical health; sick people are affected first. Smoking increases the amount of CO in the bloodstream.

* Age; infants and elderly people are more susceptible to CO poisoning.

* Pregnancy; if a woman is pregnant, CO exposure can affect the fetus.

* Altitude; the affects of CO poisoning are greater at higher altitudes.

OSHA STANDARDS:

The ambient air refers to the air in the building. The standards for CO levels in air almost always address exposure time. In 1989 the Occupational Safety and Health Administration (OSHA) adjusted revised standards for the workplace.

: 35 ppm as the threshold limit value based on a time-weighted average concentration for a normal workday (8 hours).

EPA STANDARDS:

In 1984 the U.S. Environmental Protection Agency (EPA) reevaluated the scientific data concerning health effects associated with exposure to CO. Their standards, set forth in the 1979 Clean Air Act, continues to be:

: 9 ppm for an 8 hour average and 35 ppm for a 1 hour average.

Tompkinsville Gas Standards:

Tompkinsville Gas shall affiliates its standards with the Occupational Safety and Health Administrations (OSHA) Standards.

CONCENTRATIONS OF CARBON MONOXIDE IN AIR	
35 ppm	**Time weighted average limit for continuous exposure in any 8 hour period**
200 ppm	**Short term exposure limits 15 min., slight headache, tiredness, dizziness, nausea after 2-3 hours**
400 ppm	**Front headaches within 1-2 hours, life threatening after 3 hours**
800 ppm	**Dizziness, nausea, and convulsions within 45 min. unconsciousness within 2 hours, death within 2-3 hours**
1,600 ppm	**Headache, dizziness, and nausea within 20 min., death within 1 hour**
3,200 ppm	**Headache, dizziness, and nausea within 5-10 min. death within 30 min.**
6,400 ppm	**Headache, dizziness, and nausea within 1-2 min., death within 10-15 min.**
12,800 ppm	**Death within 1-3 min.**

FLAMMABLE RANGE OF CARBON MONOXIDE

So many times we lose sight of the other dangers of carbon monoxide. We are aware of the fact that CO is a toxic physical gas and can cause death upon long exposures. But we must also guard against the other potential hazard of CO. Carbon Monoxide has a **"Flammability Range"** just like natural gas. The flammability range for carbon monoxide is **(12.5% LEL to 74% UEL)**. Carbon Monoxide is a by-product of incomplete combustion (not enough air for combustion). This means the natural gas being burned has not fully been consumed to produce harmless water vapor and carbon dioxide.

Caution should always be observed when entering an enclosure where a CO reading on test equipment indicates a level of 12.5% to 74%. When entering an enclosure and taking readings, one should take the readings in open atmosphere midway to the upper area of the ceiling. The reason is, carbon monoxide is slightly lighter than air. Air has a weight of 1.0 and carbon monoxide has a weight of .97. It will collect midway upwards to the ceiling. This is the area where the strongest concentration will be. Always remember this, **"CARBON MONOXIDE CAN EXPLODE"**.

NATURAL DISASTER PLAN

The purpose of the Emergency Response Plan is to insure an overall effective and well-organized response to any natural disaster or major system incident which would severely limit or interrupt service to electric, gas, and/or water customers. The primary objective of this plan is to protect the public and Operator's facilities and to minimize customer inconvenience due to loss of service.

The plans that comprise the Emergency Response Plan are intended to serve as a general guideline to help establish lines of communications in the event of a natural disaster or major system incident. With these lines of communication established and periodic testing of the Plan, it is hoped that the objectives can be met.

The Emergency Response Plan is comprised of separate plans. Each plan calls for convening a group of experts, or Crisis Teams, to respond and coordinate all efforts pertaining to any situation where communication and control of an incident would be improved by implementing the plan. These teams will be the focal points through which outside aid will be requested from and coordinated with local, state, and federal emergency management agencies. These teams and their responsibilities are:

EXECUTIVE CRISIS TEAM - Direction of overall response effort of , the Operator and coordinate with City and County Emergency Management Agency and other agencies when required.

SYSTEMS CRISIS TEAMS - Direction of overall response effort for restoration of service in the electric, gas, and/or water systems. System Crisis Teams are responsible for coordination between Operation Centers and appropriate Dispatch Centers.

TELECOMMUNICATIONS CRISIS TEAM - Direction of response effort for restoration of any failure in communications systems which would limit control of dispatching services and monitoring capabilities of electric, gas, and/or water systems, or severely impair normal business activities.

CORPORATE CRISIS TEAM - Coordinating all efforts aimed at returning all business activities to normal activity, so as the day to day cash flow and information processes can be resumed as soon as possible.

FACILITIES AND SECURITY CRISIS TEAMS - Coordination of all support efforts during any restoration effort. These efforts may relate to safety and security of the Operator's employees and facilities, repairs, needed to put damaged facilities back into service, the procurement and assignment of all vehicles and equipment required and the emergency purchase of supplies and material needed.

CORPORATE COMMUNICATION SERVICES - Coordination and release of all information to the news media for release to the general public.

OPERATIONS SUPPORT SYSTEMS - Coordination of all efforts in the restoration of the EMS, SCADA and/or Communication systems to the Operator's end-users.

ACTIVATION GUIDELINES

The Emergency Response Plan is designed to be modular in nature such that anyone or combination of plans can be activated when needed. Conditions that would warrant activation of the Plan include:

1. A natural disaster or major system incident has occurred.
2. One or more systems is threatened by ground movement or impending weather extremes.
3. Any circumstance where communication and control of an incident would be improved by implementing the plan.

The electric, gas, and water system plans have certain guidelines or "triggers" which call for a Key Group to assemble, assess a situation and make a recommendation to the Operator whether to declare a system emergency and activate the Plan. The declaration of a system emergency shall be made by the Operator. In the absence of the Operator, the declaration shall be made by the next in command. The Emergency Response Plan or any component therein may then be activated.

CRISIS MANAGEMENT TEAMS

Each component of the Emergency Response Plan defines who comprise the members of each Crisis Team and who the Team Leader will be. Each Plan has a call list of "primary" and "alternate" contact(s) to be notified when the Plan is activated. These teams shall coordinate the various functions which will constitute the overall response by the Operator to any natural
disaster or occurrence of any major system(s) incident.

COMMAND CENTER

Each component of the plan defines a primary and alternate *Command Center*. Each Plan also lists the resources required to be at each site. In some cases the items on these lists may be duplicated. However, where joint use can be made of some of the items, only one of those items will be stored at each site or storeroom.

Each Command Center site requires certain modifications/reassessment before it can be activated.

RESPONSE/REPAIR/RESTORATION

Whenever the Emergency Response Plan is implemented in its entirety or in part, prioritization of system response and repair restoration efforts shall be carried out as outlined in each of the respective Response (Electric, Gas, Water, etc.) Plans.

To assist in service restoration and damage assessment, the Operator should have in place an agreement with an outside service. This service will provide assessment of damaged facilities
to facilitate restoration efforts. Once assessment is done, the service can provide transportation for "key personnel" in the event ground transportation is ineffective.

OUTSIDE ASSISTANCE

The Operator shall have in place a Mutual Assistance Agreement with outside utilities, contractors and sub-contractors who will make available manpower, material, and equipment to aid in the restoration of service and facilities. Specific utilities and contractors are listed in the Emergency Call List.

PURPOSE OF PLAN

The purpose of the Gas System Emergency Response Plan is to insure an effective, professional, and well-organized response to a natural disaster or major gas system incident. The primary objectives of the plan are to protect the public safety and to minimize customer inconvenience due to gas service interruption. Specifically, the plan addresses the following areas:

1. Guidelines for activating the Gas System Emergency Response Plan.
2. The organization and responsibilities of the Crisis Team to direct the overall response to the emergency.
3. Guidelines for establishing a Command Center including the location and resources required.
4. Guidelines for general employee responsibilities during the emergency.
5. The master plan for emergency response, repair, and restoration of the gas system.

ACTIVATION GUIDELINES

The Gas System Emergency Response Plan may be activated as detailed below whenever any of the following conditions exist:

1. Natural disaster such as earthquake, tornado, flood, etc.
2. Predicted heating degree day of 55 or more
3. Unscheduled loss of a gate station
4. Any event defined as an "emergency" in *Section 121.1* of the Operating & Maintenance Procedure Manual.
5. Supply and/or capacity shortage
6. Civil disturbance.

The occurrence or prediction of any of the above listed incidents shall require the Gas System Operator to notify all affected personnel of the situation.

Emergency Response Plan Resources Team. This group shall meet and perform a preliminary assessment of the situation and recommend to the Operator whether to declare a system emergency. In the absence of the Operator the next in command shall make the emergency declaration.

This group will also assess whether full activation of the Gas Crisis team is required. If the Crisis Team needs activation, the Operator shall notify personnel using the emergency call list and instruct them to report to the Command Center where "primary" and "alternate" contacts are listed, start with the "primary" contact(s) and, if that person is not available, continue to the "alternate" contact until one is reached.

Please refer to the "Operating and Maintenance Procedure Manual" for instructions on responding to other, more isolated emergencies on the gas system and gas outage/low pressure situations.

GAS CRISIS TEAM

Whenever the Gas System Emergency Response Plan is activated, the following Crisis Team shall be assembled at the Command Center:

TEAM LEADER

System Operator
Alternate Operator

TEAM MEMBERS

Supervisor, Gas/Water Systems Operation
Supervisor, Gas Distribution Engineering
Supervisor, Customer Service
Chief Communications Officer

TEAM RESPONSIBILITIES

As the Team Leader, the Operator is responsible for heading the Gas Crisis Team and for directing the overall response to the emergency. In his absence the Alternate Operator shall lead the team. If neither are available, then the Operator shall assign a member of the Key Group to head the team. Each of the other team members shall be responsible to advise the Team Leader on the activities within their normal functional responsibilities and expertise, and to direct these activities as assigned by the Team Leader.

COMMAND CENTER

LOCATION OF CENTER

The Emergency Response Command Center shall be located at the Operations Facility or dispatchers office, if this

building is functional and not extensively damaged. If the Operations Facility is damaged and not functional, the Command Center shall be located in an assigned Command Post location predesignated within the system. Employees in these areas will be
instructed to report to the alternate location by their supervision, if necessary. Resources such as
telephones, radios, and necessary emergency communication equipment shall be relocated there or reassigned to such location.

RESOURCES FOR COMMAND CENTER

The following resources should be considered to be kept at Operator's Command Center:

Quantity	Item Description
1	AC powered cable ready television
1	Battery/ AC powered AM/FM radio
1	Battery/ AC powered hand held tape recorder
1	Battery/AC powered NOAA weather radio
1	Base Station Radio
1	System Maps
2	Hand-held flashlights
2	Telephones
1	Remote Telemetering Transmitter
1	Lap Top Computer/System Information
1	Facsimile terminal

RECORDS IN COMMAND CENTER

The following records shall be kept at the Operator's Command Center:

1. Gas main block maps (hard copy)
2. Map of City Gas System
3. Map of County Gas System
4. Meter Reading street index maps
5. Copy of the operator's Emergency Procedures
6. Copy of the operator's Operating and Maintenance Procedures
7. Copies of the Emergency Call
8. Copy of Telephone Directory (White and Yellow pages).

NOTE: During the emergency, the following information will be recorded and retained:

1. Date, time, location, and description of significant events.
2. Names and locations of employees and outside/contract employees involved.
3. Names of outside/contract employees assigned to emergency, the time they were assigned, and the time they completed their assignment.
4. A description of all work done and material used.
5. A description of any follow-up work required at later date.

MAINTENANCE OF RECORDS/RESOURCES

All records kept in the Operations Facility shall be updated through normal company procedure. The Operator of the System shall be responsible for ensuring that all Command Center records and resources are present and up to date prior to an emergency.

EMPLOYEE RESPONSIBILITIES

When an emergency involving a natural disaster occurs during normal work hours, employees will be allowed time, when requested or if necessary, to check on their families and homes as soon as practical following the incident. Employees are expected to report back to work as quickly as possible, as the Operator must respond promptly to protect the safety and well-being of the community.

When an emergency involving a natural disaster occurs during off-hours, only employees involved in initial response and restoration efforts (On call/Watch employees) should report to the Operator after ensuring the safety of their families and homes.

All employees shall report to their normal work locations unless otherwise specified or directed by their supervision or the Gas Crisis Team.

RESPONSE/REPAIR/RESTORATION PHILOSOPHY

Whenever the Gas System Emergency Response Plan is implemented, the Operator shall observe the following categorical in prioritizing the gas system response, repair and restoration efforts:

1. Response to potential dangers to public (explosions, fires, gas inside buildings, blowing gas, preventing explosions/fires)
2. Response to explosions/fires
3. Damage assessment (requiring immediate repair)
4. Shut-down
5. Repairs (short-term)
6. Restoration of service
7. Assessment of damage/system checks (for less obvious problems)
8. Repairs (long-term)

Response To Potential Dangers
The first priority will be preventing gas explosions/fires by responding to reports of large volumes of gas inside buildings or blowing gas. Top priority will be given to high-occupancy buildings which are impractical to evacuate (hospitals, nursing homes, etc.) and densely populated areas. Individual residences and businesses shall be instructed to take precautions to prevent gas explosion/fire (eliminate ignition sources, evacuate, ventilate, etc.) until we can respond.

Response To Explosions/Fires
Emphasis will be placed upon preventing explosion/fire in surrounding structures and lessening damage at the incident site by isolating the problem.

Damage Assessment (Immediate Repair)
Emphasis will be placed upon determining areas of major damage and problems requiring immediate repair. A "preliminary" damage assessment will be made by the key group assembled as a result of a triggering incident. (See: Activation Guidelines.) The key group will make a "preliminary" assessment of the situation and determine if a system emergency should be declared and recommend activation of the Plan and Gas Crisis Teams or evaluate if standard procedures are sufficient.

Gate and district regulator stations, transmission lines, major distribution lines and LNG facilities should be inspected at this time as well. Particular emphasis should be placed on any cast iron system if they exist. Aerial assessment may be the best method to inspect outlying areas. Arrangements should be made ahead of time for aerial service from well outside the affected area due to possible damage to airport/landing facilities.

If the Emergency Response Plan is activated along with the Gas Crisis Team, then the Gas Crisis Team should conduct the first full scale assessment of damages. After completion of the assessment, the Gas Crisis Team should plan the first efforts of the restoration process and communicate it to Operations facilities/dispatchers for dispersal internally and externally. If the emergency lasts several days, an assessment will be conducted each day at approximately midnight after the preceding day's work has been performed and reported. This assessment will determine present status and what the next day's strategy will be. Upon completion of that day's assessment, a strategy will be communicated in time to the work force for implementation and for communication to the media. This information should be ready to communicate by 4:00 AM.

Shut-Down of Systems
If necessary for the public safety, segments of the gas system may require shut-down. These segments should be limited to what is necessary to insure public safety to expedite the restoration process and minimize customer inconvenience. Any shut-down will be directed by the Gas System Operator, except in cases of dire emergency. In these cases shut-down must be reported to the Gas System Operator as soon as practical.

Repair (Short- Term)
Emphasis will be placed upon making necessary repairs to the gas system in order to restore service as quickly as possible. To accomplish this, it may be necessary to make temporary repairs in some situations. Top priority will be given to hospitals, nursing homes, schools and facilities critical to the emergency response/disaster recovery effort. Repairs involving the installation or replacement of mains or services will be directed by the Gas Operator. Proper records of all repairs will be kept, with emphasis on areas requiring follow-up work for permanent repair. If necessary, construction crews may need assistance from contractor crews and/or crews from other gas companies. Arrangements for outside assistance should be made ahead of time (see Outside Assistance).

Restoration Of Service
Gas service will not be restored to an area until it is safe to do so. That is, necessary repairs to the system have been made and all affected service lines have been isolated at the meter. Top priority will be given to hospitals, nursing homes, and facilities critical to the emergency response/disaster recovery effort. If necessary, all available personnel not qualified for natural gas work shall be trained and qualified under the Operator's Gas Operator Qualification Training and Evaluating Program and trained to perform relights and assist the Operator Qualified Customer Service in the restoration process. Arrangements should be made ahead of time for additional outside assistance from contractors and/or other gas companies in the event they are needed (see: Outside Assistance). Meter Readers should be used to assist outside or unfamiliar persons in locating gas meters.

Damage Assessment/System Checks
Emphasis will be placed upon checking the system for minor leaks, less obvious problems, and determining the overall integrity of the system. The first priority will be the more densely populated areas (downtown, medical center, business districts, etc.). The next priority will be the cast iron system. Leak survey will be the primary means of performing this assessment. If necessary, personnel may need assistance from outside leak survey contractors or personnel from other gas companies. Arrangements for outside assistance should be made ahead of time (see: Outside Assistance).

Repair (Long-Term)
This will involve repair work of two types. One type is the permanent repair in areas that were temporarily repaired earlier. The second type is the repair work for problems discovered in the more thorough damage assessment process described in the item above. It should be possible to limit outside assistance to contractor crews at this point.

ASSESSMENT CHECK LIST (INVESTIGATIVE)		
Preliminary Assessment	**Time**	**Remarks**
Number of reported customer outages?		
Are outages localized/widespread?		
How many gas sites are blowing?		
Where are these sites?		
Have gas crews been dispatched to blowing sites?		
How many gas related fire/explosions?		
How many gas related injuries/deaths?		
How many gas related property damages?		
Is this reportable to the Regulatory Authority?		
Is gas available from the supplier?		
What is the forecasted weather?		
Are gas facilities under threat war/civil unrest?		
How widespread is the crisis (local/state/national?)		
Is information coming in from the public?		
Should a Gas Emergency be declared?		
Should the Gas Crisis Team be activated?		

Name		Date	

ASSESSMENT CHECK LIST (ACTION TAKEN)		
Preliminary Assessment	**Time**	**Remarks**
How many transmission line are damaged?		
Number of damaged gate stations? Location?		
Number of damaged odorizer stations?		
Number of damaged regulator stations?		
Number of Cast Iron piping damaged?		
Number of over-pressure occurrences?		
Crews/personnel available? Contractor(s)?		
What is communications status (radio/phone?)		
What is communication status SCADA?		
What is transportation status (bridges/roads?)		
Has service been restored to critical facilities?		
What other utilities have been affected?		
What other Gas Crisis Teams have been activated?		
What is status of stores/material?		
What material concerns are there if any?		
Is aerial services available/needed?		
Has EMA activated their EOC?		
Has EMA activated any emergency shelters?		
Has Mutual Assistance Agreement been evoked?		
Can outside assistance get into critical areas?		
Has outside help been issued copy of call list?		
Has in-house personnel been re-assigned?		
Does outside help need food/shelter? Logistics?		
Has law enforcement been updated (crisis?)		
Has fire officials been updated (crisis?)		
Has news media been updated (crisis?)		

Name		Date	

ACCIDENT INVESTIGATION: Additional to Tompkinsville Gas O&M Manual Section 126 and the Department of Transportation CFR 49, 192.617

Each operator must establish procedures for analyzing accidents and failures, and at the least: (49 CFR 192.617. This is done to establish investigative guidelines by the Operator.

- Evaluate the situation.
- Protect life and property.
- Keep the area safe.
- Conduct a leak survey.
- Conduct pressure tests of piping.
- Do meter and regulator checks.
- Question individuals on the scene.
- Examine burn and debris patterns.
- Test odorization level.
- Record meter reading.
- Record weather conditions.
- Select samples of the failed facility or equipment for laboratory examination for the purpose of determining the causes of the failure and minimizing the possibility of recurrence.
- Notify the appropriate insurance company.

Evacuation Procedure Guidelines

If you smell natural gas or an odor you can not identify, you need to take the proper precautions. Here are steps to ensure your safety:

* Call from a remote location and not from the suspected source of the odor to report the problem. Never call from the area where you smell the odor.
* If you have called from the area of the odor, then lay down the phone, do not hang it up. It may be an ignition source.
* Go to a safe distance beyond the affect structure to make the call, preferably 150 feet away.
* Do not turn any switch on or off, it may be an ignition source.
* If evacuation is required by you or by qualified natural gas personnel or maintenance staff, remember to follow set procedures for evacuation (predetermined location) or at least 500 feet away with a buffer in front of you.

Building Evacuation

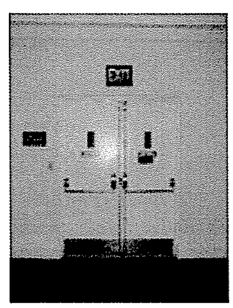
a. All building evacuations will occur when a building alarm (fire alarm) sounds and/or upon notification by qualified staff (Maintenance, Security, Fire, Director of Residence, etc.).
b. When the building evacuation alarm is activated during an emergency, leave by the nearest marked exit and alert others to do the same. ***See: Schematic of building and exit points and proceed to those exit points in a calm and orderly manner.)***
c. Assist people with disabilities in exiting the building! Remember that elevators are reserved for people with disabilities. ***NOTE: In case of fire or earthquake, do not use the elevators.***
d. Once outside, proceed to the predetermined assembly area that should be at least 500 feet away from the affected structure. ***NOTE: As you exit the structure, watch your step, watch for injury hazards such as holes, roots, sidewalks, streets, curbs, and any other obstacles that may be present in the path of evacuation. Keep streets, fire lanes, hydrant areas, and walkways clear for emergency vehicles and personnel. Know your area assembly points. If you have used a predetermined exit assembly area, or if you have been evacuated by qualified staff, then remain at that location until that qualified person or emergency personnel has return to assist you.***
e. Do not return to an evacuated building unless a "All Safe" siren/alarm as sounded or you are told to do so by a qualified official.

Campus Evacuation

a. Evacuation of all or part of the campus will be announced by the Department of Campus Safety or appropriate agency.
b. All persons (students and staff) are to vacate immediately the area of the campus in question and relocate to another part of the campus grounds or off campus if directed.
* ***Lockdown:*** It may be safer to lock buildings down without evacuating in certain situations (e.g. armed intruder on campus).
a. Plans will be developed to lock the affected areas in a timely manner.
b. Subjects in affected buildings will be instructed to stay away from windows to minimize exposure.
* ***Evacuation of Persons with Disabilities.***
a. If you are unable to leave the building due to a physical disability:
. Go to the nearest area where there are no hazards.
. Use a person who can exit the area and have that individual contact Campus Safety by telephone or use other means to advise them of the situation.
. Be sure to give them the room number so they can send help to you.
. If possible, signal out the window to others who can assist or on-site emergency responders.
. Try to establish a "buddy" system to have someone ready to assist you in the event you would need evacuation.
b. To assist visually impaired persons
. Announce the type of emergency.
. Offer your arm for guidance. **Never grab the person, it may startle the person and may cause an injury**.
. Tell the person where you are going, obstacles you encounter.
. When you reach safety, ask if further help is needed.

c. To alert people with hearing limitations
. Turn lights on/off to gain the person's attention, or
. Indicate directions with gestures, or
. Write a note with evacuation directions.
d. To evacuate people using crutches, canes, or walkers
. Evacuate these individuals as injured persons.
. Assist and accompany to evacuation site if possible, or
. Use a sturdy chair (or one with wheels) to move the person, or
. Help carry individual.
e. To evacuate wheelchair users
. Non-ambulatory person's needs and preferences vary.
. Individuals at ground floor locations may exit without help.
. Others have minimal ability to move-lifting may be dangerous.
. Some non-ambulatory persons may have respiratory complications.
. Remove them from smoke and vapors immediately.
. Wheelchair users with electrical respirators get priority assistance.
. Most wheelchairs are too heavy to take down stairs.
. Consult with the person to determine best carry options.
. Reunite the person with the chair as soon as it is safe to do so.
** To Implement an Evacuation*
. Remain calm.
. Alert others to assist with evacuation.
. Communicate clearly and succinctly. (Example: **"We have a type of emergency. Evacuate but "DO NOT" use the elevators."**)
. Assist persons with disabilities.
. Check offices, classrooms, and restrooms.
. Do not turn equipment on nor off.
. Leave the doors you leave by open to ventilate the atmosphere. ***NOTE: If doors are automatic or electric, "DO NOT" operate them if at all possible!***
. Take emergency supplies. ***See: Emergency Supply Kit.***
. Keep exiting groups together.
. Qualified staff should assist students.
. Gather at the evacuation site and await for instructions.
. Account for faculty, staff, and students. (Roster of students/visitors : DR, staff and security.)
. Exit the building via the nearest safe exit route. Walk, do not run. Do not use elevators to exit.
. Move away from the building, report to the unit's designated evacuation point.
. Account for faculty, staff, and students and sign in at evacuation point.
. Wait at evacuation point for directions.
. Do not reenter the building until emergency staff gives the "all clear" signal. (The silencing of the building fire alarm system is normally used as the "all clear" signal. In some cases, the fire alarm will be silenced and staff members placed at building entrances to keep people out until the incident has been resolved.)

See Example of "Evacuation Postings" below;



First Aid Instructions Fainting, Unconsciousness, and Shock	Recommended Items to Include in a Basic Emergency Supply Kit:
* Have victim lie or sit down and rest * Keep victim comfortable, not hot or cold * Ask or look for emergency medical ID. * Treat other injuries as necessary ***Mouth to Mouth Resuscitation*** * Place victim on side and remove foreign matter from mouth with finger * Place victim on back * Tilt victim's head back to open airway * Close victim's nostrils with fingers * Inhale and place your mouth over victim's mouth * Exhale until victim's chest expands * Repeat every five seconds * Keep trying until help arrives * If problem, check victim for airway obstruction ***Severe Bleeding and Wounds*** * **AVOID DIRECT CONTACT WITH BLOOD; IF POSSIBLE WEAR SURGICAL RUBBER GLOVES WHEN BLEEDING IS INVOLVED** * Apply direct pressure on wound * Use clean cloth or hand * Apply pressure to blood vessel, if necessary * Elevate body part * Add more cloth if blood soaks through * Keep pressure on wound until help arrives * Use tourniquet only as last resort ***Choking*** * Check victim's mouth and clear of foreign matter * Lower head and give back blows * Still choking, use abdominal thrusts ***Heart Attack*** * Place victim laying down on back * Give resuscitation or CPR as necessary (if trained) * Keep victim comfortable, not hot or cold * Ask or look for emergency medical ID. ***Burns, Thermal and Chemical*** * Immerse burned area in cold water * Flood chemical burn with cool water * Cover burn with dry bandage * Keep victim quiet and comfortable ***Fractures and Sprains*** * Keep victim still * Keep injured area immobile * **CAUTION: HEAD, NECK OR BACK INJURY**: Any victim suspected of having head, neck or back injury, keep absolutely still. Treat for shock if necessary and keep warm ***Poisoning and Overdose*** * Determine what substance is involved and how taken * Stay with victim and assist as necessary * If choking, lower head ***Diabetic*** * Check for medical tag and make call	* Water, one gallon of water per person per day for at least three days, for drinking and sanitation * Food, at least a three-day supply of non-perishable food * Battery-powered or hand crank radio and extra batteries for both radio and flashlight. * Whistle to signal for help * Dust Mask to help filter contaminated air. * Moist towelettes, garbage bags and plastic ties for personal sanitation. * Wrench or pliers to turn off utilities * Can opener for food (if kit contains canned food) * Local maps ***Additional Items to Consider Adding to an Emergency Supply Kit:*** * Prescription medications and glasses * Infant formula and diapers * Pet food and extra water for your pet * Important family documents such as copies of insurance policies, identification and bank account records in a waterproof, portable container * Cash or traveler's checks and change * Emergency reference material such as a first aid book or information from www.ready .gov * Sleeping bag or warm blanket for each person. * Consider additional bedding if you live in a cold-weather climate. * Complete change of clothing including a long sleeved shirt, long pants and sturdy shoes. Consider additional clothing if you live in a cold-weather climate. * Household chlorine bleach and medicine dropper * When diluted nine parts water to one part bleach, bleach can be used as a disinfectant. Or in an emergency, you can use it to treat water by using 16 drops of regular household liquid bleach per gallon of water. Do not use scented, color safe or bleaches with added cleaners. * Fire Extinguisher * Matches in a waterproof container * Feminine supplies and personal hygiene items * Mess kits, paper cups, plates and plastic utensils, paper towels * Paper and pencil

First Aid Kit	Disabled and Special Needs
Things you should have: * Two pairs of Latex, or other sterile gloves (if you are allergic to Latex). * Sterile dressings to stop bleeding. * Cleansing agent/soap and antibiotic towelettes to disinfect. * Antibiotic ointment to prevent infection. * Burn ointment to prevent infection. * Adhesive bandages in a variety of sizes. * Eye wash solution to flush the eyes or as general decontaminate. * Thermometer * Prescription medications you take every day such as insulin, heart medicine and asthma inhalers. You should periodically rotate medicines to account for expiration dates. * Prescribed medical supplies such as glucose and blood pressure monitoring equipment and supplies. ***Things it may be good to have*** * Cell Phone * Scissors * Tweezers * Tube of petroleum jelly or other types of lubricant ***Non-prescription drugs:*** * Aspirin or nonaspirin pain reliever * Anti-diarrhea medication * Antacid (for upset stomach) * Laxative	***For People with Disabilities:*** * Create a support network to help in an emergency. * Tell these people where you keep your emergency supplies. * Give one member of your support network a key to your house or apartment. * Contact your city or county government's emergency information management office. Many local offices keep lists of people with disabilities so they can be located quickly in a sudden emergency. * Wear medical alert tags or bracelets to help identify your disability.(Diabetes) * If you are dependent on dialysis or other life sustaining treatment, know the location and availability of more than one facility. * Show others how to operate your wheelchair. * Know the size and weight of your wheelchair, in addition to whether or not it is collapsible, in case it has to be transported. * Additional Supplies for People with Disabilities: * Prescription medicines, list of medications including dosage, list of any allergies. * Extra eyeglasses and hearing-aid batteries. * Extra wheelchair batteries, oxygen. * Keep a list of the style and serial number of medical devices. * Medical insurance and Medicare cards. * List of doctors, relatives or friends who should be notified if you are hurt.

IDENTIFYING WAYS TO CONTROL STATIC ELECTRIC CHARGES ON PLASTIC PIPING

A static charge can accumulate on both the inner and outer surfaces of plastic piping as well as on metal, if the metal is isolated from the ground with an insulating material (a metal fitting or a squeeze-off tool on a plastic pipe). There are always static charges on the surface of isolated or non-conducting materials. These charges are significant when they become large enough to produce an arc to a grounded conductor. Conditions conductive to charge accumulation include isolation from grounded conductors, low humidity, and when the rate of generating static charges is greater than the bleed-off rate.

A static charge can bleed-off slowly to a lower level by conduction through air, or by progressive induction, or conduction to nearby materials. A swift bleed-off, or a static discharge, may be evidenced by a "jolt" when an operator approaches within 6" or less of a charged surface. However, because of the very low current the electrical magnitude is not enough to cause injury.

Although voltages are high (9,000 volts from handling the pipe: 14,000 volts from wiping the pipe with a cloth; and 24,000 volts from the turbulence of the gas flow), the electric current of a static discharge is extremely low. The danger occurs when the spark, if over 3,000 volts, generates enough heat to ignite the gas-in-air mixture.

Since plastic pipe is an excellent insulator, it cannot be grounded in the same manner as steel pipe. Static charges build up on specific spots on both the interior and exterior surfaces of the pipe. Therefore, to ground the static charges on the outside of the pipe, the entire outside surface must be in contact with ground. The static charges on the internal pipe surface, located near the point where the pipe has separated, must also be grounded to prevent a static spark.

Grounding can be accomplished by establishing and maintaining a film of moisture on the pipe surface. Water atone is not adequate because it will form unconnected droplets rather than a continuous film.

A continuous film is created and maintained on the pipe by applying a water-liquid dishwashing detergent solution to the exposed pipe surface, starting at the point where the pipe is in contact with the soil and continuing until the entire pipe surface has been wetted down.

After the surface of the exposed plastic pipe has been wetted down with wet burlap or a cotton wrap (which has been dipped into a bucket of water-liquid dishwashing detergent solution). It may also be draped around the plastic pipe starting at the point where the pipe enters the soil. (see figure 1). Wet burlap will only remain conductive as long as it is moist. If this method is used, it is important that the wet burlap be in continuous contact with the ground because ungrounded wet burlap can result in a higher energy spark than dry pipe, if accidentally discharged. Synthetic material such as nylon, rayon, and polyesters should not be used as the wet cloth because they are not absorbent enough to provide the conductivity required. Also, they have a tendency to create a static charge under certain conditions.

PRELIMINARY PRECAUTIONS

When confronted with a gas leak from a damaged plastic pipe, initial consideration should be given to the potential static electric condition which may exist. Once it has been decided to perform construction activities or make repairs on plastic pipe which is used to distribute gas, certain preliminary precautions are suggested. Some companies have included the following:

1) Persons working with the pipe should wear flame resistant coveralls, flame resistant gloves, nomex hoods, hard hats, and air tight goggles. If available, fresh air breathing apparatus should be used when applicable.

2) Position a manned fire extinguisher near the bell hole opening, taking into consideration the direction of blowing gas and wind direction.

3) Spray the entire exposed surface of the plastic pipe with a water and detergent solution.

4) Ground a broken tracer wire by sticking the exposed ends into the ground away from the plastic pipe.

5) Spray the locating tape or marking tape with a water and detergent solution, and tuck the tape into the soil away from the pipe to prevent contact with the pipe.

6) From the top of the bell hole drape the exposed plastic pipe with burlap which has been completely saturated with a water and detergent solution. Cover the pipe from the ground to the break or area to be cut

CONTROLLING STATIC ELECTRICITY DURING CONSTRUCTION

After the preliminary precautions to prevent the discharge of static electricity through the air, the next phase is the completion of the construction activity. At this stage utilize the following precautions:

1) Continue to have a manned fire extinguisher at the work site.

2) If the plastic pipe has been damaged leaving the ends of the pipe open, spray the internal surfaces with a mixture of water and detergent solution. Static charges may accumulate near the end of the pipe and discharge to ground.

3) Wrap wet burlap saturated with a mixture of water and detergent solution around the pipe. Wrap the pipe beginning where the pipe is in contact with the ground, as illustrated in figure 1.

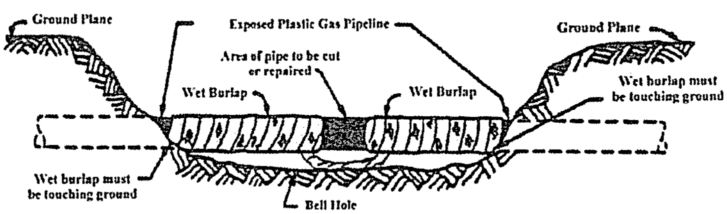


FIGURE #1: Wrapping Plastic Pipe to Control Static Electricity

4)Be certain the wet burlap is in contact with the ground. Ungrounded wet burlap can create a higher static charge than dry plastic pipe, if accidentally discharged.

5)Check the burlap frequently to make sure it is wet enough to provide a path for static charges to move off the pipe to ground.

6)If pipe cutters designed for cutting plastic are used to cut the plastic pipe, coat the exposed pipe surface with a mixture of water and detergent solution. Also, make sure the wet burlap is touching the cutter on both sides.

7)If the pipe is cut with a saw or pipe scissors, ground the cutting tool used with a No. 12 AW6 standard copper wire, brazed to the tool at one end and a ground rod at the other end. Drive the ground rod into the ground before using the cutting tool(s).

8)When the pipe is cut in two, spray the surface of the interior of the pipe with a mixture of a water and detergent solution.

9)Continue spraying the wet burlap and plastic pipe surface with a mixture of water and detergent solution until the pipe has been repaired/modified, and there is no gas-in-air mixture in or near the bell hole.

USE OF THE SQUEEZE-OFF TOOLS

The use of squeeze-off tools to stop the flow of gas in a plastic pipe creates a turbulence within the carrier pipe and increases the velocity of the gas flow at the point of squeeze-off. Both the increased turbulence and increased velocity of gas flow significantly increases the accumulation of static charges on the pipe surfaces.

In the case of line breaks when squeeze-off tools are used, utilize the precautions already listed along with the following alternatives:

1)Open three bell holes, one for the pipe work area and two for the squeeze-off tools. Only two bell holes will be required, if one squeeze-off tool Is used. The procedure is illustrated in figure 2.

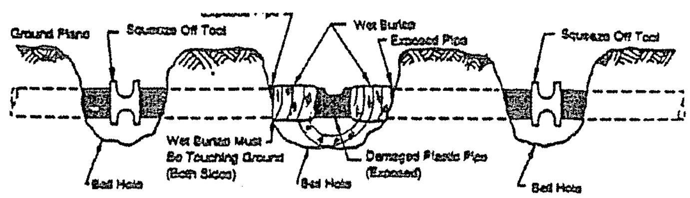


FIGURE #2: Controlling Static Electricity When Squeeze-Off Tools Are Used

2)Locate the squeeze-off tools in a separate bell hole away from the exposed work area. The increased friction resulting from the use of the squeeze-off tools could cause a significant static discharge to the ground at the point of the break in the plastic pipe.

3)In case the pipe is continuous and construction requirements necessitate cutting the pipe, the squeeze-off tool may be located in the same bell hole as long as it is grounded and all the precautions listed have been met.

TEMPORARY REPAIRS OF PINHOLE LEAKS

1) When making temporary repairs of pinhole leaks, follow the same procedure outlined in the section on "Controlling Static Electricity During Construction" (with the exception of item No. 7). An example of the situation of the pinhole gas leak: A gas piping system which has an 1/8" hole in a plastic pipe leaking gas under 50 psi can generate 1,000 to 4,000 volts in the immediate area of the hole. The immediate area on either side of the pinhole may contain charges of 10,000 to 20,000 volts.

2) After installing the temporary repair damp, cover the exposed pipe until a permanent repair can be made.

PURGING PLASTIC PIPE OF NATURAL GAS

Natural gas passing through the open end of a plastic pipe generates static charges. Therefore, to control the static charge the end of the pipe is grounded the same as a pipe break or modification. The following procedures are suggested:

1) Open two belt holes. Open one belt hole to expose the pipe end and one bell hole for the squeeze-off tool, as illustrated in figure 3.

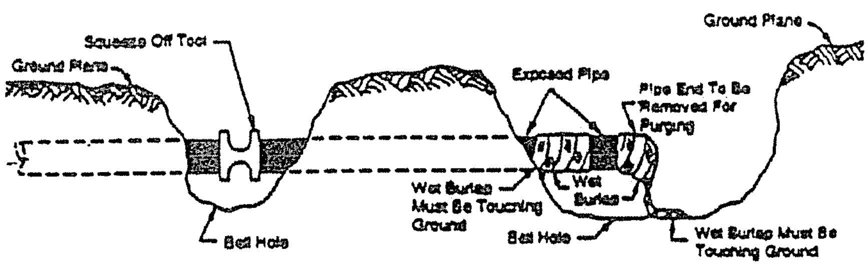


FIGURE #3: Purging Plastic Pipe of Natural Gas

2) Shut off the gas flow to the end of the pipe with the squeeze-off tool before removing the pipe end.

3) Using a water and detergent solution, spray the plastic pipe in the bell hole which exposes the end of the pipe. Wrap wet burlap material around the pipe on either side of the area where the pipe is to be cut Be sure all the wet burlap is touching the ground at some point

4) After the pipe end has been removed and before releasing the squeeze-off tool, install a section of steel pipe with a pullout resistant coupling. This eliminates static at the pipe end. Release the squeeze-off tool and purge the pipe. Check the burlap frequently to make sure it is saturated with water.

5) Do not remove the wet burlap material until all gas has been purged, and there is no gas-in-air mixture in the bell hole.

TOMPKINSVILLE EMERGENCY CALL LIST				
NAME	TITLE	HOME	OFFICE	MOBILE
Harold Frazier	Operator/Manager	270-487-5613	270-487-6776	270-407-8212
Ricky Birge	Utility Personnel		270-487-6776	270-427-8272
Jackie Adams	Utility Personnel		270-487-6776	270-427-6605
Tompkinsville Police			270-487-6191/911	
Tompkinsville Fire			270-487-6221/911	
Monroe County Sheriff			270-487-6622	
Monroe County Fire			270-487-9431	
Mudlick Fire			270-427-3456	
Ky State Police/Columbia		1-800-222-5555 * 270-384-4796		
Monroe Cty Ambulance			270-487-8757	
Monroe Medical			270-487-9231	
Texas Eastern/Duke			606-365-2117	
Randy Dean			606-365-2117	859-516-8192
Tim Gagle			270-427-4282	270-576-7449

TOMPKINSVILLE DAYTIME EMERGENCY PHONE NUMBERS 7:30AM-4:30PM	
270-487-6776	911
AFTER HOURS 4:30PM-7:30AM, WEEKENDS AND HOLIDAYS EMERGENCY PHONE NUMBER	
270-487-6776	911

NOTE: IF ANY SITUATION HAS BEEN DEEMED SERIOUS ENOUGH TO WARRANT A RESPONSE, PLEASE NOTIFY THE PERSONNEL HIGHLIGHTED IN "BLUE".

CITY OF TOMPKINSVILLE SUPPLIERS/CONTRACTORS/VENDORS CALL LIST				
NAME	TITLE	HOME	OFFICE	MOBILE
Danny Spencer	Consultant			9901-634-5226

KENTUCKY PUBLIC SERVICE COMMISSION (502) 564-3940

In the event of an accident or emergency that may possibly relate to natural gas, hazardous liquid or propane as its origin, the following action is required:
Telephonic notice at the earliest possible moment (not to exceed two hours) following discovery of:
1. Death or Personal Injury
2. Gas Igniting Unintentionally
3. Damage to Property ($25,000 or more)
4. Unscheduled Outage for 40 or More Customers for 4 or More Hours
5. Any Other Significant Occurrence (Newsworthy)

Reference:
807 KAR 5:006, Section 26
807 KAR 5:022, Section 13(16)(a)
807 KAR 5:027, Section 3(1)(a),(b),(c),(d),(f),(g)
807 KAR 5:027, Section 4
49 CFR Part 191.5

This reporting does not relieve you of your responsibility of reporting to the U.S. Department of Transportation (DOT) in accordance with 49 CFR Part 191.5. During office hours (8 a.m. to 4:30 p.m.), please call Mr. Jason Brangers at (502) 564-3940, ext. 416. If Mr. Brangers is unavailable, you will be transferred to other staff who will take the information concerning the incident. At any other time, please call one of the following:

NAME	POSITION	PHONE
William (Bill) Aitken	**Senior Utility Investigator**	**(502) 749-6805**
Melissa Holbrook	**Utility Investigator**	**(606) 743-4602**
Steve Samples	**Utility Investigator**	**(502) 223-3245**
Joel Grugin	**Utility Investigator**	**(502) 484-2160**
Jason Brangers	**Gas Branch Manager**	**(502) 633-5268**
Kimra H. Cole	**Director of Engineering**	**(502) 694-3940**

Notification to the Commission's voice mailbox or FAX number will not be considered proper notification.
In time of emergency, notice to the Kentucky Emergency Management - Emergency Operations Center at 1-800-255-2587 or (502) 564-7815 will result in the notification of all other emergency response personnel.
Recurring events and further investigation will dictate additional telephonic reporting. Follow-up written notification to the Commission is to be submitted within 30 days.

Jason Brangers, Manager
Gas Pipeline Safety Branch, Division of Engineering
Public Service Commission
P. O. Box 615
Frankfort, Kentucky 40602
(502)564-3940, ext: 416, Fax (502)564-1582

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**Public Awareness Plan
RP 1162**

TOMPKINSVILLE PUBLIC AWARENESS PLAN

Public Education Requirements in 49 CFR Part 192

The following are the existing regulatory requirements for public education from the pipeline safety regulations.

192.615 Emergency Plans

192.615(a)(8) Notifying appropriate fire, police, and other public officials of gas pipeline emergencies and coordinating with them both planned responses and actual responses during an emergency.

192.615(c) Each operator shall establish and maintain liaison with appropriate fire, police, and other public officials to:

(1) Learn the responsibility and resources of each government organization that may respond to a gas pipeline emergency;
(2) Acquaint the officials with the operator's ability in responding to a gas pipeline emergency;
(3) Identify the types of gas pipeline emergencies of which the operator notifies the officials; and,
(4) Plan how the operator and officials can engage in mutual assistance to minimize hazards to life, injury and property.

§192.616 Public Education

Each operator shall establish a continuing educational program to enable customers, the public, appropriate government organizations, and persons engaged in excavation related activities to recognize a gas pipeline emergency for the purpose of reporting it to the operator or the appropriate public officials. The program and the media used must be as comprehensive as necessary to reach all areas in which the operator transports gas. The program must be conducted in English and in other languages commonly understood by a significant number and concentration of the non-English speaking population in the operator's area.

The Pipeline Safety Improvement Act of 2002 requires each gas utility and pipeline operator to evaluate the effectiveness of its public awareness programs and make improvements where necessary. Operations and communications experts from the American Petroleum Institute (API), Interstate Natural Gas Association of America (INGAA), American Gas Association (AGA) and American Public Gas Association (APGA) developed API Recommended Practice 1162 to provide guidance for what constitutes an effective public awareness program. The Office of Pipeline Safety (OPS) has indicated that RP 1162 will be the benchmark against which it will compare each operator's public awareness program.

As with any other plan required under the Pipeline Safety Act, it is important that you follow your public awareness plan to the letter.

PUBLIC AWARENESS PROGRAM OBJECTIVES

The objectives of this Public Awareness Program are:

* To educate our customers how to recognize the odor of natural gas and how to respond if they detect possible gas odors. Early recognition of a gas odor and proper response can save lives.

* To raise the awareness of the affected public and key stakeholders of the presence of buried natural gas pipelines in the communities we serve. A more informed public will also understand that they have a significant role in helping to prevent third-party damage accidents.

* To help excavators understand the steps that they can take to prevent third party damage and respond properly if they cause damage to our pipelines.

* To help emergency response agencies that may assist Tompkinsville in an emergency and understand the proper actions to take in response to a gas release or emergency.

* To educate the public on the symptoms of carbon monoxide poisoning and the appropriate treatment should CO poisoning be suspected.

* To educate the public about the protection of gas meters from damage by falling snow or other objects.

Public Awareness Policy

Our goal is to provide safe, reliable gas service to our customers and ensure the safety of those living and working near our gas pipelines. Public awareness is a critical component of our overall safety program. Every employee of Tompkinsville is committed to fulfilling our public awareness responsibilities as described in this Public Awareness Program.

1. Program Administration
Harold Frazier is responsible for the overall conduct of this Public Awareness Program. The Program Administrator is responsible to ensure that:

- Target audiences are identified,
- Message(s) appropriate to each audience are identified,
- Appropriate media are selected to transmit each message to each audience,
- Appropriate message delivery frequencies are identified for each message and audience,
- Messages are delivered as specified in the plan,
- The effectiveness of the program is periodically evaluated, and
- The plan is modified to reflect the findings of the effectiveness evaluation.

In addition to the Program Administrator, the following individuals are responsible for various aspects of the Public Awareness Program:

Harold Frazier is responsible to periodically review the performance of the Public Awareness Program and the individuals responsible for its continued effectiveness. The following individuals and groups shall share responsibility for coordinating and communicating needs and suggestions to the operator to ensure continued success.

A. Utility Management/City Manager
B. Gas Operator
C. Experienced Personnel
D. Engineering
E. Communication Personnel
F. News/Media
G. Law Enforcement
H. Legal Representatives
I. Mechanical Contractors
J. Home builders
K. Land developers
L. One-Call Centers

The Program Administrator is responsible to develop and maintain a list of each of these stakeholder audiences.

Note: API RP 1162 requires that the plan describe the method(s) that will be used to identify stakeholders in each category.

- The list of our customers will be generated and maintained by Tompkinsville gas operator.
- The list of government and emergency response officials will be obtained by contacting each city and county government in which Tompkinsville operates gas pipelines.

- The names, addresses and telephone numbers of each excavator and each type of excavator will be obtained and maintained. Public Works and street, road and highway departments will be identified by contacting each city and county government in which Tompkinsville operates gas pipelines. *NOTE: Tompkinsville is a member of the ONE-CALL system and the ONE-CALL system develops and maintains this list. Tompkinsville may request from the ONE-CALL office an updated copy of this list.*
- The list of individuals living and working near our pipeline will be developed by matching nine-digit zip code numbers to areas which are crossed by Tompkinsville underground pipelines. Addresses, but not names of individuals, within these zip codes will be listed. *NOTE: If means of contact are used other than direct mail to reach non-customer individuals living and working near pipelines (e.g.newspaper, radio and television), then a list of addresses does not need to be maintained.*

4. Message Type, Content and Frequency

The following messages type and content will be sent to each stakeholder audience via the media listed at the frequency indicated:

NOTE: These are the recommended message type, frequency and media from API RP 1162. Each operator should consider each of these in its program. The rationale for any decision to deviate from the recommendations should be documented. *NOTE:* ***THE USE OF BILL STUFFERS ARE NOT CONSIDERED ADEQUATE FOR COMMUNICATING WITH NON-CUSTOMERS LIVING NEAR YOUR PIPELINES UNLESS YOU ARE AN ELECTRIC AND/OR WATER UTILITY THAT HAS EVERY BUILDING AS A CUSTOMER.***

<table>
<tr><th>Stakeholder Audience</th><th>Message Type</th><th>Frequency</th><th>Suggested Delivery method and Media</th></tr>
<tr><td></td><td>• Awareness of hazards and prevention measures undertaken
• Damage Prevention Awareness
• Leak recognition and response
• How to get additional information
• Other
The following message types are not part of API 1162, however some systems have additional messages such as these that they communicate to customers. Include any additional messages here and delete the following if they do not apply
• Carbon Monoxide Safety
• Safety Near Gas Meters</td><td>Supplemental Frequency:
• Additional frequency and supplemental efforts as determined by specifics of the pipeline segment or environment</td><td>Supplemental Activity:
• Targeted Distribution of Print Materials</td></tr>
<tr><td colspan="4">4.2 Emergency Officials</td></tr>
<tr><td rowspan="2">Emergency Officials</td><td rowspan="2">Baseline Messages:
• Pipeline purpose and reliability
• Awareness of hazards and prevention measures undertaken
• Emergency Preparedness Communications
• How to get additional information
• What to do
• Who to contact</td><td>Baseline Frequency
Annual (12 months not to exceed 15 months.)</td><td>Baseline Activity:
• Print Materials And
• Liaisons Meetings (annually)</td></tr>
<tr><td>Supplemental Frequency:
• Additional frequency and supplemental efforts as determined by the specifics of the pipeline segment or environment</td><td>Supplemental Activity:
• Telephone calls
• Personal Contact
• Videos and CDs</td></tr>
<tr><td></td><td>Supplemental Messages:
• One-Call system performance
• Accurate line location information
• One-Call system improvements</td><td>Supplemental Frequency:
As changes in pipeline routes and contact information occur as required by state requirements</td><td>Supplement Activity:
• Targeted Distribution of Print Materials
• Personal Contact
• Telephone Calls
• Maps (as required)</td></tr>
</table>

5. Development of Program Materials

The Program Administrator is responsible for ensuring that materials are developed and acquired for each communication activity listed above. Materials should be pre-tested for clarity, understandability, and retain-ability before they are widely used. The exercise should be performed using a small representative audience, for example, a small sample group of Tompkinsville employees and/or families that are not involved in developing the public awareness program, a small sample section of the intended stakeholder audience and effected groups. Currently the suggested method to be used for contact would be bill stuffers and direct mail (contact), email notices and updates (where email addresses are available), targeted local cable TV and radio ads and educational CDs. See **"Media Public Notifications" section in this manual.**

The Public Awareness Program will be conducted in English and in other languages commonly understood by a significant number of and concentration of the non-English speaking population in our service area. To determine the languages that should be considered the Program Manager may contact local election boards to determine in what languages voting ballots are required to be provided in the communities we serve. *Informacion puede venir de parte casa consistorial o utilidad (empresa de servicio publico.) Estar a la mira de periodistico notificacion.*

6. Program Implementation

The Program Administrator is responsible to ensure that each target audience identified shall receive the appropriate materials through the listed specified methods (e.g. mass mailings, emergency official meetings) at the frequency specified in the preceding table. The Program Administrator should prepare an annual estimate of the resources required to implement the Program and request specific budgeted funds to implement the required notifications and liaisons meeting to achieve successful results.

7. Management of Input/Feedback/Comments Received

It is anticipated that the implementation of this public awareness program will generate requests for further information from those in the stakeholder audiences contacted. All inquiries should be directed to the Program Administrator. Program Administrator shall use the offices of; Pipeline Safety, Public Service Commission, any and all Regulator Authorities, and pipeline suppliers for additional public service announcements, educational pamphlet, flyers and on-line site information to educate the public.

Inquiries about the location of pipelines should be directed to the ONE-CALL system or any Damage Prevention Coordinating Councils operating within your state of residence.

Operator Accountability Statement

As pipeline requirements evolve to secure education and experienced accountability in the natural gas industry, Tompkinsville has ensured compliance of educational Operator Qualification Final Rule and the RP 1162 requirements with a customized Operating and Maintenance Procedures and Emergency Procedures that cross reference each other for a greater understanding of procedures, policies and federal mandates. Tompkinsville has currently addressed in the Tompkinsville Operating and Maintenance/Emergency Procedures all requirements of the RP 1162 as listed in the following sections of the Tompkinsville Operating and Maintenance/Emergency Procedure manual:

Section #128 Public Education/Communications

Section # 129 Damage Prevention

Section #130 Liaisons with Public Officials

Emergency Call List

NOTE: These areas are as well represented in the Emergency Procedure manual in detail.

8. Residence along pipeline facilities/Natural gas consumers and non-consumers

Tompkinsville Natural Gas shall establish and deliver all baseline messages to gas consumers and non-gas consumers in it's dedicated area base on Federal Standard 192.5 Class Locations.

192.5 FEDERAL STANDARD

192.5 Class locations.(a) This section classifies pipeline locations for purposes of this part. The following criteria apply to classifications under this section.

(1) A "class location unit" is an onshore area that extends 220 yards on either side of the centerline of any continuous 1- mile length of pipeline.

(2) Each separate dwelling unit in a multiple dwelling unit building is counted as a separate building intended for human occupancy.

(b) Except as provided in paragraph (c) of this section, pipeline locations are classified as follows:

(1) A Class 1 location is:

(i) An offshore area; or

(ii) Any class location unit that has 10 or fewer buildings intended for human occupancy.

(2) A Class 2 location is any class location unit that has more than 10 but fewer than 46 buildings intended for human occupancy.

(3) A Class 3 location is:

(i) Any class location unit that has 46 or more buildings intended for human occupancy; or

(ii) An area where the pipeline lies within 100 yards of either a building or a small, well- defined outside area (such as a playground, recreation area, outdoor theater, or other place of public assembly) that is occupied by 20 or more persons on at least 5 days a week for 10 weeks in any 12-month period. (The days and weeks need not be consecutive.)

(4) A Class 4 location is any class location unit where buildings with four or more stories above ground are prevalent.

(c) The length of Class locations 2, 3, and 4 may be adjusted as follows:

(1) A Class 4 location ends 220 yards from the nearest building with four or more stories above ground.

(2) When a cluster of buildings intended for human occupancy requires a Class 2 or 3 location, the class location ends 220 yards from the nearest building in the cluster.

Baseline messages shall be delivered to residence along transmission lines and distribution lines in the Tompkinsville Natural Gas dedicated areas through mass mail-outs. These messages shall address the dangers of natural gas and the emergency response contact telephone numbers as well as additional educational information concerning the dangers and recognition of natural gas and unusual odors. These messages shall be delivered as public service announcements, educational pamphlet, flyers. Currently Tompkinsville Natural Gas is using Public Notification flyers which address local state call before you dig, One-Call system (811 Common Ground Alliance) as well as pipeline marker identification, detection and suspicion of natural gas present. These flyers contain specific education procedures as to safety and emergency contact telephone numbers. These messages are both in English and Spanish based on the latest census at present. All Public Notifications are located in Section of this manual. In the event of major failure, disaster, or subversive and terrorist activity, the local television, radio stations and newspapers shall be contacted in a joint effort of local EMA, utility and city officials and shall issue a Public Broadcast statement to the effect. Section ● of this manual contains all the television station, radio stations and newspapers in Tompkinsville and surrounding areas. Educational information concerning "Emergency Relief Routes" out of the area can also be accessed at local EMA offices, utility offices and city hall. Section ● in this manual contains the emergency relief routes and personnel assignment areas. Police, Fire and all emergency first responders shall communicate annually through Public Liaisons Meetings to review and exchange updated phone numbers, radio numbers, pager numbers and assignment information.

Educational material can also be accessed at City Hall as well as the Tompkinsville Natural Gas utility office.

9. Program review and audit

Tompkinsville Natural Gas shall conduct a annual review of the Public Awareness Plan to ascertain effectiveness in reaching all natural gas consumers and non-natural gas consumers as well as Public Liaisons Meetings with all first responders. Tompkinsville Operating and Maintenance Procedures shall be made available to address problems with exacting procedures:

128 Public Education/Communications

128.1 There shall be a continuing education program to enable customers, the public, appropriate government agencies, and persons engaged in excavation activities to recognize a gas emergency for the purpose of reporting it to Tompkinsville Gas Operator. CFR 49, 192.616

128.2 The following is a minimal list of information to be supplied:

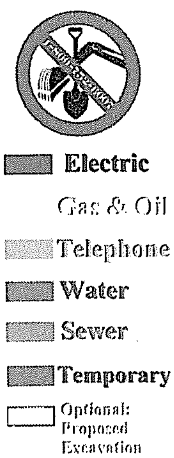
1. Information about gas.
2. Recognition of gas odor.
3. What to do and what not to do when a strong gas odor is detected.
4. Necessity of notifying the Gas Operator prior to excavating or performing excavation-related activities. (Kentucky One-Call System, Inc.)
5. Telephone number to call for information or to report an emergency.

128.3 Information may be conveyed to the public by radio, television, newspaper, meetings, public talks, bill stuffers, mailings, and/or handouts.

128.4 A record of the public education program and related activities shall be maintained by the Manager of the Gas System/Gas Operator.

129 Damage Prevention

129.1 Tompkinsville is a member of the Kentucky One-Call System 1-800-752-6007. Anyone considering underground construction is to be encouraged to call for underground utility location at least two (2) working days prior to digging.



129.2 Tompkinsville Gas Operator shall maintain a continuously updated, list of all persons requesting underground utility location in its service area.

129.3 Tompkinsville Gas Operator shall raise public awareness of the one call system through newspaper, radio and television advertisements, postings at public/government buildings and bill stuffers.

129.4 Underground construction contractors will be routinely reminded of the one call system at pre-construction meetings and in their dealings with Tompkinsville Gas Operator distribution personnel.

129.5 All requests for facility locations, including those generated within Tompkinsville Gas Operator shall be directed to the Kentucky One Call System to ensure consistency in service and record keeping. Parties requesting locations may contact the Tompkinsville Gas Operator to check the status of their request.

129.6 Kentucky One Call System tells the locate requestor which utility companies will be notified and suggests that if there are any other known utilities in the area, those companies should be contacted directly. Kentucky One Call System further informs the caller of the date the locate is to be completed and assigns the requesting caller a number which can be used to verify the request and check the status of location work.

129.7 Gas piping locations are to be indicated by yellow paint and or wooden stakes and approved flags marked "Gas". Any offset used in marking to preserve the markings shall be duly noted on the ground or stake. Water and underground electric lines are to be similarly marked using blue and red.

129.8 If there is reason to believe proposed underground construction will damage the pipeline, the locator is to notify the operator or appropriate gas personnel in which the work is proposed. A gas distribution representative will contact and coordinate with the excavator to ensure the integrity of the pipeline through adequate inspection of work.

129.9 A team of utility companies, excavators, locators, contractors, etc. have for the purpose of damage prevention and improving communications between all members of the excavating community. This is done to provide a forum of concerned professionals to have a joint effort in developing a plan to protect life and property for the people of Kentucky.

Tompkinsville Natural Gas currently partners with the Kentucky-One-Call System as well as utilization of benefits from the Damaged Prevention Coordinating Council of Kentucky. Tompkinsville Natural Gas Damage Prevention Program includes the following:

❶ Identification on a daily basis of person(s) engaged in excavating activities in the area of pipeline facilities of Tompkinsville Natural Gas. These excavation activities shall include but not be restrict to the following; (a) Digging, (b) boring, (c) blasting, (d) and earth movement.

❷Notification of the public in the area of the excavating activities as well as the notification of person(s) performing the excavating activities shall be on a basis as often as necessary to inform such groups of the damage prevention program. That information shall include the following:

a. The programs existence and purpose.
b. Identify locations of piping prior to any excavations.
c. Means of receiving and recording notifications of planned work.
d. Locations of the operator's pipeline shall be communicated to person(s) perform the excavating activities.
e. Temporary locations of marking of pipeline facilities.
f. Investigation of pipelines that may be damaged by excavating activities.
g. Inspections shall be carried out before and after excavations to verify the integrity of the pipeline facility.
h. Blasting shall be followed with a patrol and a leak survey of all areas affected by the seismic effect of blasting.
i. All piping requiring repair or support to ensure continued integrity of the pipeline facility shall be initiated according to the feasibility and severity of the current condition of the pipeline facility.

130 Liaison with Public Officials

130.1 Annual liaison shall be maintained with the appropriate fire and police organizations and the Emergency Management Agency with respect to gas emergency procedures. The purpose of such liaison shall be to acquaint the appropriate governmental agencies with Tompkinsville's ability to respond to a gas system emergency and to discuss the responsibilities of each agency that may respond to a gas emergency.

130.2 Gas emergency training sessions, emphasizing proper procedures to follow in a gas emergency, may be scheduled with fire and police organizations or performed in Safety Meeting sessions as required. Operator qualification training and evaluations are the standard at which emergency training is conducted annually.

130.3 Liaison with the Emergency Management Agency will be coordinated by the Gas Operator as part of the "Tompkinsville Emergency Response Plan."

130.4 Liaison with local fire and police agencies will be coordinated by the Gas Operator.

130.5 Records of meetings or training sessions held with governmental agencies for the purpose of gas emergency response shall be kept on file addressing safety related training and available for state regulatory inspectors.

10. Program effectiveness evaluation

Tompkinsville Natural Gas shall send out a mass mail-out for public education and notification based on the following:

* Residence living along transmission ROW (Interval 2 years)
* Residence living along distribution ROW (Interval 1 year)
* Public Officials (Interval 1 year)
* Excavators/Contractors/Third parties (Interval 1 year)
* Stakeholders (Interval 1 year)

NOTE: See tables below for schedules and audience participation.

With each mail-out, Tompkinsville Natural Gas shall enclose an evaluation card for the audience participant to evaluate the program, offer suggestions for greater effectiveness in the educational process. 100% participation shall be strived for. Returns shall throughly be reviewed and counted to access audience participation. Addresses on evaluation returns shall be strategically identified and mapped for future areas for pinpointing greater efforts in reaching the audience. See Section for "Evaluation Cards."

TABLE 2-1
Public Awareness Communications for
Hazardous Liquids and Natural Gas Transmission Pipeline Operators

Stakeholder Audience	Message Type	Delivery Frequency	Delivery Method and/or Media
2-1.1 Affected Public			
Residents located along transmission pipeline ROW **and** **Areas of Assembly**	**Baseline Messages:** • Pipeline purpose and reliability • Awareness of hazards and prevention measures undertaken • Damage Prevention Awareness • One-Call Requirements • Leak Recognition and Response • Pipeline Location Information • How to get additional information • Availability of list of pipeline operators through NPMS	**Baseline Frequency** 2 years	**Baseline Activity:** • Targeted Distribution of Print Materials, AND • Pipeline markers
	Supplemental Message: • Information and/or overview of operators Integrity Management Plan • ROW encroachment prevention • Any planned major maintenance construction activity	**Supplemental Frequency:** Additional frequency and supplemental efforts as determined by specifics of the pipeline segment or environment	**Supplemental Activity:** • Print Materials • Personal Contact • Telephone Calls • Group Meetings • Open Houses
Residents near storage or other major operational facilities	**Supplemental Message:** • Information and/or overview of operator's Integrity Management Plan • Special incident response notification and/or evacuation measures *if* appropriate to product or facility • Facility purpose	**Supplemental Frequency:** Additional frequency and supplemental efforts as determined by specifics of the pipeline segment or environment	**Supplemental Activity:** • Print Materials • Personal Contact • Telephone Calls • Group Meetings • Open Houses

TABLE 2-1.2
RP 1162 Program Recommendations

<table>
<tr><td colspan="4">2-1.2 Emergency Officials</td></tr>
<tr><td rowspan="2">Emergency Officials</td><td>Baseline Messages:
• Pipeline purpose and reliability
• Awareness of hazards and prevention measures undertaken
• Emergency Preparedness Communications
• Potential Hazards
• Pipeline Location Information and availability of NPMS
• How to get additional information</td><td>Baseline Frequency
Annual (12 months not to exceed 15 months.)</td><td>Baseline Activity:
• Personal Contact (generally preferred) OR
• Targeted Distribution of Print Materials OR
• Group Meetings OR
• Telephone calls with Targeted Distribution of Print Materials</td></tr>
<tr><td>Supplemental Message:
• Provide information and/or overview of Integrity measures undertaken
• Maintenance construction activity</td><td>Supplemental Frequency:
Additional frequency and supplemental efforts as determined by specifics of the pipeline segment or environment</td><td>Supplemental Activity:
• Emergency Tabletop, Deployment Exercises
• Facility Tour
• Open House</td></tr>
<tr><td colspan="4">2-1.3 Local Public Officials</td></tr>
<tr><td rowspan="2">Public Officials</td><td>Baseline Messages:
• Pipeline purpose and reliability
• Awareness of hazards and prevention measures undertaken
• Emergency preparedness Communications
• One Call requirements
• Pipeline Location Info and availability of NPMS
• How to get additional information</td><td>Baseline Frequency
3 years</td><td>Baseline Activity:
• Targeted Distribution of Print Materials</td></tr>
<tr><td>Supplemental Message:
• If applicable, provide information about designation of HCA (or other factors unique to segment) and summary of integrity measures undertaken
• ROW encroachment prevention
• Maintenance Construction activity</td><td>Supplemental Frequency:
• If in HCA, then annual contact to appropriate public safety officials
• Otherwise, as appropriate to level of activity or upon request</td><td>Supplemental Activity:
• Personal Contact
• Telephone Calls
• Videos and CDs</td></tr>
</table>

TABLE 2-1.4
RP 1162 Program Recommendations

2-1.4 Excavators			
Excavators/ Contractors	**Baseline Messages:** • Pipeline purpose and reliability • Awareness of hazards and prevention measures undertaken • Damage Prevention Awareness • One-call Requirements • Leak Recognition and Response • How to get additional information	**Baseline Frequency** Annual (12 months not to exceed 15 months)	**Baseline Activity:** • Targeted Distribution of Print Materials • One-Call Center Outreach AND • Pipeline Markers
	Supplemental Message: Pipeline purpose, prevention measures and reliability	**Supplemental Frequency:** Additional frequency and supplemental efforts as determined by specifics of the pipeline segment or environment	**Supplemental Activity:** • Personal Contact • Group Meetings
Land Developers	**Supplemental Messages:** • Pipeline purpose and reliability • Awareness of hazards and prevention measures undertaken • Damage Prevention Awareness • One Call requirements • Leak Recognition and Response • ROW Encroachment Prevention • Availability of list of pipeline operators through NPMS	**Supplemental Frequency:** Frequency as determined by specifics of the pipeline segment or environment	**Supplemental Activity:** • Targeted Distribution of Print Materials • Pipeline Markers • Personal Contact • Group Meetings • Telephone Calls
One-Call Centers	• Pipeline location information • Other requirements of the applicable One-Call Center	• Requirements of the applicable One-Call Center	**Baseline Activity:** • Membership in Appropriate One-Call Center • Requirements of the Applicable One-Call Center • Maps (as required)
	Supplemental Messages: • One-Call system performance • Accurate line location information • One-Call system improvements	**Supplemental Frequency:** As changes in pipeline routes or contact information occur or as required by state requirements	**Supplement Activity:** • Targeted Distribution of Print Materials • Personal Contact • Telephone Calls

TABLE 2-2
Public Awareness Communications for
Local Natural Gas Distribution (LDC) Companies

Stakeholder Audience	Message Type	Suggested Frequency	Suggested Delivery Method and/or Media
2-1.1 Affected Public			
Residents along the Distribution System	**Baseline Messages:** • Pipeline purpose and reliability • Awareness of hazards and prevention measures undertaken • Damage Prevention Awareness • Leak Recognition and Response • How to get additional information	**Baseline Frequency** Annual (12 months not to exceed 15 months) **Supplemental Frequency:** • Additional frequency and supplemental efforts as determined by specifics of the pipeline segment or environment	**Baseline Activity:** • Public Service *Announcements*, OR • Paid Advertising OR • Bill Stuffers (for combination electric & gas companies) **Supplemental Activity:** • Targeted Distribution of Print Materials • Newspaper and Magazines • Community Events or • Community Neighborhood Newsletters
LDC Customers	**Baseline Messages:** • Pipeline purpose and reliability • Awareness of hazards and prevention measures undertaken • Damage Prevention Awareness • Leak Recognition and Response • How to get additional information	**Baseline Frequency** Bio-annually **Supplemental Frequency:** • Additional frequency and supplemental efforts as determined by specifics of the pipeline segment or environment	**Baseline Activity:** • Bill stuffers **Supplemental Activity:** • Targeted Distribution of Print Materials

TABLE 2-2.1
RP 1162 Program Recommendations

<table>
<tr><td colspan="4">2-2.2 Emergency Officials</td></tr>
<tr><td rowspan="2">Emergency Officials</td><td rowspan="2">Baseline Messages:
• Pipeline purpose and reliability
• Awareness of hazards and prevention measures undertaken
• Emergency Preparedness Communications
• How to get additional information</td><td>Baseline Frequency
Annual (12 months not to exceed 15 months)</td><td>Baseline Activity:
• Print Materials
OR
• Group Meetings</td></tr>
<tr><td>Supplemental Frequency:
Additional frequency and supplemental efforts as determined by specifics of the pipeline segment or environment</td><td>Supplemental Activity:
• Telephone calls
• Personal Contact
• Videos & CDs</td></tr>
<tr><td colspan="4">2 - 2.3 Local Public Officials</td></tr>
<tr><td>Public Officials</td><td rowspan="2">Baseline Messages:
• Pipeline purpose and reliability
• Awareness of hazards and prevention measures undertaken
• Emergency Preparedness Communications
• How to get additional information</td><td>Baseline Frequency
3 years</td><td>Baseline Activity:
• Targeted Distribution of Print Materials</td></tr>
<tr><td></td><td>Supplemental Frequency:
Additional frequency and supplemental efforts as determined by specifics of the pipeline segment or environment</td><td>Supplement Activity:
• Group Meetings
• Telephone Calls
• Personal Contact</td></tr>
<tr><td colspan="4">2-2.4 Excavators</td></tr>
<tr><td>Excavators / Contractors</td><td>Baseline Messages:
• Pipeline purpose and reliability
• Awareness of hazards and prevention measures undertaken
• Leak Recognition and Response
• One Call requirements
• How to get additional information</td><td>Baseline Frequency
Annual (12 months not to exceed 15 months)

Supplemental Frequency:
Additional frequency and supplemental efforts as determined by specifics of the pipeline segment or environment</td><td>Baseline Activity:
• One-Call Center Outreach
OR
• Group Meetings

Supplemental Activity:
• Personal Contact
• Videos & CDs
• Open Houses</td></tr>
</table>

TABLE 2-3
RP 1162 Program Recommendations

Stakeholder Audience	Message Type	Suggested Frequency	Suggested Delivery Method and/or Media
One-Call Centers	• Pipeline location information • Other requirements of the applicable One-Call Center	• Requirements of the applicable One-Call Center	**Baseline Activity:** • Membership in Appropriate One-Call Center • Requirements of the Applicable One-Call Center • Maps (as required)
	Supplemental Messages: • One-Call system performance • Accurate line location information • One-Call system improvements	**Supplemental Frequency:** As changes in pipeline routes or contact information occur or as required by state requirements	**Supplement Activity:** • Targeted Distribution of Print Materials • Personal Contact • Telephone Calls • Maps (as required)

TABLE 2-3.1
RP 1162 Program Recommendations

<table>
<tr><th>Stakeholder Audience</th><th>Message Type</th><th>Delivery Frequency</th><th>Delivery Method and/or Media</th></tr>
<tr><td colspan="4">2 - 3.1 Affected Public</td></tr>
<tr><td rowspan="2">Residents,

and

Areas of Assembly within area of potential impact</td><td>Baseline Messages:
• Gathering pipeline purpose
• Awareness of hazards
• Prevention measures taken
• Damage Prevention Awareness
• One Call requirements
• Leak Recognition and Response
• How to get additional information</td><td>Baseline Frequency
2 years</td><td>Baseline Activity:
• Targeted Distribution of Print Materials
• Personal Contact</td></tr>
<tr><td>Supplemental Messages:
• Planned maintenance construction activity
• Special emergency procedures if sour gas or other segment specific reason</td><td>Supplemental Frequency:
• Annually for sour gas gathering lines
• Additional frequency as determined by specifics of the pipeline segment or environment</td><td>Supplemental Activity:
may include:
• Pipeline Markers
• Print Materials
• Personal Contact
• Telephone Calls
• Group Meetings
• Mass Media
• Other Activities described in Section 5</td></tr>
<tr><td colspan="4">2 -3.2 Emergency Officials</td></tr>
<tr><td rowspan="2">Emergency Officials</td><td>Baseline Messages:
• Gathering pipeline location and purpose
• Awareness of hazards
• Prevention measures undertaken
• Emergency Preparedness Communications, Company contact and response information
• Specific description of products transported and any potential special hazards
• How to get additional information</td><td rowspan="2">Baseline Frequency
Annual</td><td>Baseline Activity:
• Personal Contact (generally preferred) OR
• Targeted Distribution of Print Materials OR
• Group Meetings OR
• Telephone Calls with Targeted Distribution of Print Materials</td></tr>
<tr><td>Supplemental Messages:
• Planned maintenance construction activity
• Special emergency procedures if sour gas or other segment specific reason</td><td>Supplemental Activity:
• Emergency Tabletop Deployment Exercises
• Facility Tour
• Open House</td></tr>
</table>

TABLE 2-2.3
RP 1162 Program Recommendations

Stakeholder Audience	Message Type	Delivery Frequency	Delivery Method and/or Media
2-3.3 Local Public Officials			
Public Officials	**Baseline Messages:** • General location and purpose of gathering pipeline • Awareness of hazards • Prevention measures undertaken • Copies of materials provided to Affected Public and Emergency Officials • Company Contacts • How to get additional information	**Baseline Frequency** 3 years	**Baseline Activity:** • Targeted Distribution of Print Materials
	Supplemental Messages: • ROW encroachment prevention • Maintenance Construction Activity • Special emergency procedures if sour gas or other segment specific reasons	**Supplemental Frequency:** • If in HCA, then more frequent or annual contact with appropriate public safety officials • Otherwise as appropriate to level of activity or upon request	**Supplemental Activity:** • Personal Contact • Telephone Calls • Videos and CDs
2 -3.4 Excavators			
Excavators / Contractors	**Baseline Messages:** • General location and purpose of gathering pipeline • Awareness of hazards • Prevention measures undertaken • Damage Prevention Awareness • One Call requirements • Leak Recognition and Response • How to get additional information	**Baseline Frequency** Annual	**Baseline Activity:** • Targeted Distribution of Print Materials • One-Call Center Outreach AND • Pipeline Markers **Supplemental Activity:** • Personal Contact • Group Meetings • One-Call center Outreach • Mass Media
Land Developers	**Supplemental Messages:** • General location and purpose of gathering pipeline • Awareness of hazards • Prevention measures undertaken • Damage Prevention Awareness	**Supplemental Frequency:** Frequency as determined by specifics of the pipeline segment or environment	**Supplemental Activity:** • Targeted Distribution of Print Materials • Personal Contact • Group Meetings • Telephone Calls

TABLE 2-4
RP 1162 Program Recommendations

Stakeholder Audience	Message Type	Suggested Frequency	Suggested Delivery Method and/or Media
One-Call Centers	• Pipeline location information • Other requirements of the applicable One-Call Center	• Requirements of the applicable One-Call Center	**Baseline Activity:** • Membership in Appropriate One-Call Center • Requirements of the Applicable One-Call Center • *Maps (as required)*
	Supplemental Messages: • One-Call system performance • Accurate line location information • One-Call system improvements	**Supplemental Frequency:** As changes in pipeline routes or contact information occur or as required by state requirements	**Supplement Activity:** • Targeted Distribution of Print Materials • Personal Contact • Telephone Calls • Maps (as required)

PUBLIC AWARENESS PLAN EDUCATION OF THE DISASTER PLAN

The purpose of the Emergency Response Plan is to ensure an overall effective and well-organized response to any disaster or major system incident which would severely limit or interrupt service to electric, gas, and/or water customers. The primary objective of this plan is to protect the public and the Operator's facilities and to minimize customer inconvenience due to loss of service. Scheduled meetings (liaisons meetings, planned neighborhood meetings, contractor meetings, qualifying meetings, etc.) shall be used to communicate and promote public awareness to all stakeholders with concern to all issues addressed in the RP 1162 as well as the review and involvement of those stakeholders in the area of education of any and all potential disasters and correct response and reaction to those disasters. Education of the public of such plans may aid in a successful response to a disaster. Response to disasters in the past have been ill prepared for as well as incorrectly responded too. Federal mandates and requirements of such responses leave little explanation of coordination and team work during actual disasters. Due to potential legal actions against federal agency requirements, the federal administrators often issue meager attempts at guides to address required actions to create operator plans. After customization of these plans the plans are often reviewed by the inspectors to ensure compliance of establish protocols for such plans and recommendations may be issued. To successfully have a Public Awareness Plan and address all legal accountability issues, the plan must address all actual and imagined disasters and/or incidents/accidents that may arise. The operator must be prepared for all potentials. Each plan should address Homeland Security issues as well. As stated in the House Resolution (HR) 3609 ***The Pipeline Infrastructure Protection to Enhance Security and Safety Act,*** introduced December 2001, finalizing pipeline safety legislation. Revisions were approved by both House and Senate. The bill HR 3609 created and was amended and entitled, Pipeline Safety Improvement Act of 2002 (Act). It was signed by President Bush December 17, 2002. The Act contains numerous provisions that tighten federal inspection and safety requirements for natural gas or hazardous liquids pipeline facilities. ***Pipeline Security Information Circular and Pipeline Security Contingency Planning Guidance***, was developed by RSPA in conjunction with major industry groups, when evaluating operators' security plans. Hazardous liquid pipelines will be evaluated according to the American Petroleum Institute's "Guidelines for Developing and Implementing Security Plans for Petroleum Pipelines." Natural gas transmission and distribution pipelines, including liquefied natural gas facilities, will be evaluated according to the "Security Guidelines: Natural Gas Industry, Transmission and Distribution," developed by the American Gas Association and the Interstate Natural Gas Association of America. For operators that do not belong to a trade association, RSPA/OPS will provide the appropriate industry consensus security guidance documents upon request.

Protection of Operator's Security-Related Information: RSPA/OPS recognizes that operators have concerns about the ability to protect operator security related information from disclosure. RSPA/OPS will withhold any security related information in their possession if it is sought under FOIA, as long as it is either: (1) commercial information that if released would likely cause an operator substantial competitive harm; or (2) related directly to the security of an operator's pipeline facilities.

Follow-Up Action:

* An operator's process for conducting vulnerability assessments (if needed) of its critical facilities;
* cyber security methods for protecting its computer systems that are essential for the safe operation of the pipeline;
* ***procedures for training employees, including contractors, to respond appropriately during a security incident;***
* procedures explaining how an operator would receive threat notification (physical attack, cyber attack, etc) and how it would disseminate this information to its employees, contractors, FBI, RSPA/OPS or other appropriate public officials;
* ***a process for controlling access to its facilities for both individuals and vehicles; (e.g. badging, visitor screening, vehicle searches);***
* ***coordination with existing response plans, as necessary; how an operator would expedite restoration of service with minimal disruption (e.g. establishing a spare parts inventory, procedures for rerouting product to other lines);***
* how the security plan conforms to the guidance developed by pipeline industry trade associations;
* ***procedures, for conducting background checks on employees and/or contractors.***

NOTE: The contracting company shall be expected to participate and adhere to all security related issues within the gas operator's facilities at all times. Contractors shall be held accountable for their employees at all times while engage in performance of work in and around a secure area. Contractor personnel may be ask to report unusual activity and or damage to the gas operator's facility.

NOTE: This information is provide for the education of participant who are and wish to be involved in public awareness education of utilities and their facilities. Security and legal accountability issues must be exercised during educational exchanges with the public and stakeholders. Information handed out or exchanged must not be security sensitive. If an operator meets all the requirements to need a Pipeline Security Contingency Plan, then that plan must not be part of any issued material to the public and/or stakeholders.

Inquiries may be addressed through the follow agency:

Associate Administrator for Pipeline Safety
Room 7128
Research and Special Programs Administration
United States Department of Transportation
400 Seventh Street, S. W.
Washington, DC 20590

e-mail address: pipeline.security@rspa.dot.gov

The plans that comprise the Emergency Response Plan are intended to serve as a general guideline to help establish lines of communications in the event of a disaster or major system incident. With these lines of communication established and periodic testing of the Plan, it is hoped that the objectives can be met.

The Emergency Response Plan is comprised of separate plans. Each plan calls for convening a group of experts, or Crisis Teams, to respond and coordinate all efforts pertaining to any situation where communication and control of an incident would be improved by implementing the plan. These teams will be the focal points through which outside aid will be requested from and coordinated with local, state, and federal emergency management agencies. These teams and their responsibilities are:

EXECUTIVE CRISIS TEAM - Direction of overall response effort of , the Operator and coordinate with City and County Emergency Management Agency and other agencies when required.

SYSTEMS CRISIS TEAMS - Direction of overall response effort for restoration of service in the electric, gas, and/or water systems. System Crisis Teams are responsible for coordination between Operation Centers and appropriate Dispatch Centers.

TELECOMMUNICATIONS CRISIS TEAM - Direction of response effort for restoration of any failure in communications systems which would limit control of dispatching services and monitoring capabilities of electric, gas, and/or water systems, or severely impair normal business activities.

CORPORATE CRISIS TEAM - Coordinating all efforts aimed at returning all business activities to normal activity, so as the day to day cash flow and information processes can be resumed as soon as possible.

FACILITIES AND SECURITY CRISIS TEAMS - Coordination of all support efforts during any restoration effort. These efforts may relate to safety and security of the Operator's employees and facilities, repairs , needed to put damaged facilities back into service, the procurement and assignment of all vehicles and equipment required and the emergency purchase of supplies and material needed.

CORPORATE COMMUNICATION SERVICES - Coordination and release of all information to the news media for release to the general public.

OPERATIONS SUPPORT SYSTEMS - Coordination of all efforts in the restoration of the EMS, SCADA and/or Communication systems to the Operator's end-users.

ACTIVATION GUIDELINES

The Emergency Response Plan is designed to be modular in nature such that anyone or combination of plans can be activated when needed. Conditions that would warrant activation of the Plan include:

1. A natural disaster or major system incident has occurred.
2. One or more systems is threatened by ground movement or impending weather extremes.
3. Any circumstance where communication and control of an incident would be improved by implementing the plan.

The electric, gas, and water system plans have certain guidelines or "triggers" which call for a Key Group to assemble, assess a situation and make a recommendation to the Operator whether to declare a system emergency and activate the Plan. The declaration of a system emergency shall be made by the Operator. In the absence of the Operator, the declaration shall be made by the next in command. The Emergency Response Plan or any component therein may then be activated.

CRISIS MANAGEMENT TEAMS

Each component of the Emergency Response Plan defines who comprise the members of each Crisis Team and who the Team Leader will be. Each Plan has a call list of "primary" and "alternate" contact(s) to be notified when the Plan is activated. These teams shall coordinate the various functions which will constitute the overall response by the Operator to any natural disaster or occurrence of any major system(s) incident.

COMMAND CENTER

Each component of the plan defines a primary and alternate *Command Center*. Each Plan also lists the resources required to be at each site. In some cases the items on these lists may be duplicated. However, where joint use can be made of some of the items, only one of those items will be stored at each site or storeroom.

Each Command Center site requires certain modifications/reassessment before it can be activated.

RESPONSE/REPAIR/RESTORATION

Whenever the Emergency Response Plan is implemented in its entirety or in part, prioritization of system response and repair restoration efforts shall be carried out as outlined in each of the respective Response (Electric, Gas, Water, etc.) Plans.

To assist in service restoration and damage assessment, the Operator should have in place an agreement with an outside service. This service will provide assessment of damaged facilities to facilitate restoration efforts. Once assessment is done, the service can provide transportation for "key personnel" in the event ground transportation is ineffective.

OUTSIDE ASSISTANCE

The Operator shall have in place a Mutual Assistance Agreement with outside utilities, contractors and sub-contractors who will make available manpower, material, and equipment to aid in the restoration of service and facilities. Specific utilities and contractors are listed in the Emergency Call List.

PURPOSE OF PLAN

The purpose of the Gas System Emergency Response Plan is to insure an effective, professional, and well-organized response to a natural disaster or major gas system incident. The primary objectives of the plan are to protect the public safety and to minimize customer inconvenience due to gas service interruption. Specifically, the plan addresses the following areas:

1. Guidelines for activating the Gas System Emergency Response Plan.
2. The organization and responsibilities of the Crisis Team to direct the overall response to the emergency.
3. Guidelines for establishing a Command Center including the location and resources required.
4. Guidelines for general employee responsibilities during the emergency.
5. The master plan for emergency response, repair, and restoration of the gas system.

ACTIVATION GUIDELINES

The Gas System Emergency Response Plan may be activated as detailed below whenever any of the following conditions exist:

1. Natural disaster such as earthquake, tornado, flood, etc.
2. Predicted heating degree day of 55 or more
3. Unscheduled loss of a gate station
4. Any event defined as an "emergency" in *Section 121.1* of the Operating & Maintenance Procedure Manual.
5. Supply and/or capacity shortage
6. Civil disturbance.

The occurrence or prediction of any of the above listed incidents shall require the Gas System Operator to notify all affected personnel of the situation.

Emergency Response Plan Resources Team. This group shall meet and perform a preliminary assessment of the situation and recommend to the Operator whether to declare a system emergency. In the absence of the Operator the next in command shall make the emergency declaration.

This group will also assess whether full activation of the Gas Crisis team is required. If the Crisis Team needs activation, the Operator shall notify personnel using the emergency call list and instruct them to report to the Command Center where "primary" and "alternate" contacts are listed, start with the "primary" contact(s) and, if that person is not available, continue to the "alternate" contact until one is reached.

Please refer to the "Operating and Maintenance Procedure Manual" for instructions on responding to other, more isolated emergencies on the gas system and gas outage/low pressure situations.

GAS CRISIS TEAM

Whenever the Gas System Emergency Response Plan is activated, the following Crisis Team shall be assembled at the Command Center:

TEAM LEADER

System Operator
Alternate Operator

TEAM MEMBERS

Supervisor, Gas/Water Systems Operation
Supervisor, Gas Distribution Engineering
Supervisor, Customer Service
Chief Communications Officer

TEAM RESPONSIBILITIES

As the Team Leader, the Operator is responsible for heading the Gas Crisis Team and for directing the overall response to the emergency. In his absence the Alternate Operator shall lead the team. If neither are available, then the

Operator shall assign a member of the Key Group to head the team. Each of the other team members shall be responsible to advise the Team Leader on the activities within their normal functional responsibilities and expertise, and to direct these activities as assigned by the Team Leader.

COMMAND CENTER

LOCATION OF CENTER

The Emergency Response Command Center shall be located at the Operations Facility or dispatchers office, if this building is functional and not extensively damaged. If the Operations Facility is damaged and not functional, the Command Center shall be located in an assigned Command Post location predesignated within the system. Employees in these areas will be
instructed to report to the alternate location by their supervision, if necessary. Resources such as
telephones, radios, and necessary emergency communication equipment shall be relocated there or reassigned to such location.

RESOURCES FOR COMMAND CENTER

The following resources should be considered to be kept at Operator's Command Center:

Quantity	Item Description
1	AC powered cable ready television
1	Battery/ AC powered AM/FM radio
1	Battery/ AC powered hand held tape recorder
1	Battery/AC powered NOAA weather radio
1	Base Station Radio
1	System Maps
2	Hand-held flashlights
2	Telephones
1	Remote Telemetering Transmitter
1	Lap Top Computer/System Information
1	Facsimile terminal

RECORDS IN COMMAND CENTER

The following records shall be kept at the Operator's Command Center:

1. Gas main block maps (hard copy)
2. Map of City Gas System
3. Map of County Gas System
4. Meter Reading street index maps
5. Copy of the operator's Emergency Procedures
6. Copy of the operator's Operating and Maintenance Procedures
7. Copies of the Emergency Call
8. Copy of Telephone Directory (White and Yellow pages).

NOTE: During the emergency, the following information will be recorded and retained:

1. Date, time, location, and description of significant events.
2. Names and locations of employees and outside/contract employees involved.
3. Names of outside/contract employees assigned to emergency, the time they were assigned, and the time they completed their assignment.
4. A description of all work done and material used.
5. A description of any follow-up work required at later date.

MAINTENANCE OF RECORDS/RESOURCES

All records kept in the Operations Facility shall be updated through normal company procedure. The Operator of the System shall be responsible for ensuring that all Command Center records and resources are present and up to date prior to an emergency.

EMPLOYEE RESPONSIBILITIES

When an emergency involving a natural disaster occurs during normal work hours, employees will be allowed time, when requested or if necessary, to check on their families and homes as soon as practical following the incident. Employees are expected to report back to work as quickly as possible, as the Operator must respond promptly to protect the safety and well-being of the community.

When an emergency involving a natural disaster occurs during off-hours, only employees involved in initial response and restoration efforts (On call/Watch employees) should report to the Operator after ensuring the safety of their families and homes.

All employees shall report to their normal work locations unless otherwise specified or directed by their supervision or the Gas Crisis Team.

RESPONSE/REPAIR/RESTORATION PHILOSOPHY

Whenever the Gas System Emergency Response Plan is implemented, the Operator shall observe the following categorical in prioritizing the gas system response, repair and restoration efforts:

1. Response to potential dangers to public (explosions, fires, gas inside buildings, blowing gas, preventing explosions/fires)
2. Response to explosions/fires
3. Damage assessment (requiring immediate repair)
4. Shut-down
5. Repairs (short-term)
6. Restoration of service
7. Assessment of damage/system checks (for less obvious problems)
8. Repairs (long-term)

Response To Potential Dangers
The first priority will be preventing gas explosions/fires by responding to reports of large volumes of gas inside buildings or blowing gas. Top priority will be given to high-occupancy buildings which are impractical to evacuate (hospitals, nursing homes, etc.) and densely populated areas. Individual residences and businesses shall be instructed to take precautions to prevent gas explosion/fire (eliminate ignition sources, evacuate, ventilate, etc.) until we can respond.

Response To Explosions/Fires
Emphasis will be placed upon preventing explosion/fire in surrounding structures and lessening damage at the incident site by isolating the problem.

Damage Assessment (Immediate Repair)
Emphasis will be placed upon determining areas of major damage and problems requiring immediate repair. A

"preliminary" damage assessment will be made by the key group assembled as a result of a triggering incident. (See: Activation Guidelines.) The key group will make a "preliminary" assessment of the situation and determine if a system emergency should be declared and recommend activation of the Plan and Gas Crisis Teams or evaluate if standard procedures are sufficient.

Gate and district regulator stations, transmission lines, major distribution lines and LNG facilities should be inspected at this time as well. Particular emphasis should be placed on any cast iron system if they exist. Aerial assessment may be the best method to inspect outlying areas. Arrangements should be made ahead of time for aerial service from well outside the affected area due to possible damage to airport/landing facilities.

If the Emergency Response Plan is activated along with the Gas Crisis Team, then the Gas Crisis Team should conduct the first full scale assessment of damages. After completion of the assessment, the Gas Crisis Team should plan the first efforts of the restoration process and communicate it to Operations facilities/dispatchers for dispersal internally and externally. If the emergency lasts several days, an assessment will be conducted each day at approximately midnight after the preceding day's work has been performed and reported. This assessment will determine present status and what the next day's strategy will be. Upon completion of that day's assessment, a strategy will be communicated in time to the work force for implementation and for communication to the media. This information should be ready to communicate by 4:00 AM.

Shut-Down of Systems
If necessary for the public safety, segments of the gas system may require shut-down. These segments should be limited to what is necessary to insure public safety to expedite the restoration process and minimize customer inconvenience. Any shut-down will be directed by the Gas System Operator, except in cases of dire emergency. In these cases shut-down must be reported to the Gas System Operator as soon as practical.

Repair (Short- Term)
Emphasis will be placed upon making necessary repairs to the gas system in order to restore service as quickly as possible. To accomplish this, it may be necessary to make temporary repairs in some situations. Top priority will be given to hospitals, nursing homes, schools and facilities critical to the emergency response/disaster recovery effort. Repairs involving the installation or replacement of mains or services will be directed by the Gas Operator. Proper records of all repairs will be kept, with emphasis on areas requiring follow-up work for permanent repair. If necessary, construction crews may need assistance from contractor crews and/or crews from other gas companies. Arrangements for outside assistance should be made ahead of time (see Outside Assistance).

Restoration Of Service
Gas service will not be restored to an area until it is safe to do so. That is, necessary repairs to the system have been made and all affected service lines have been isolated at the meter. Top priority will be given to hospitals, nursing homes, and facilities critical to the emergency response/disaster recovery effort. If necessary, all available personnel not qualified for natural gas work shall be trained and qualified under the Operator's Gas Operator Qualification Training and Evaluating Program and trained to perform relights and assist the Operator Qualified Customer Service in the restoration process. Arrangements should be made ahead of time for additional outside assistance from contractors and/or other gas companies in the event they are needed (see: Outside Assistance). Meter Readers should be used to assist outside or unfamiliar persons in locating gas meters.

Damage Assessment/System Checks
Emphasis will be placed upon checking the system for minor leaks, less obvious problems, and determining the overall integrity of the system. The first priority will be the more densely populated areas (downtown, medical center, business districts, etc.). The next priority will be the cast iron system. Leak survey will be the primary means of performing this assessment. If necessary, personnel may need assistance from outside leak survey contractors or personnel from other gas companies. Arrangements for outside assistance should be made ahead of time (see: Outside Assistance).

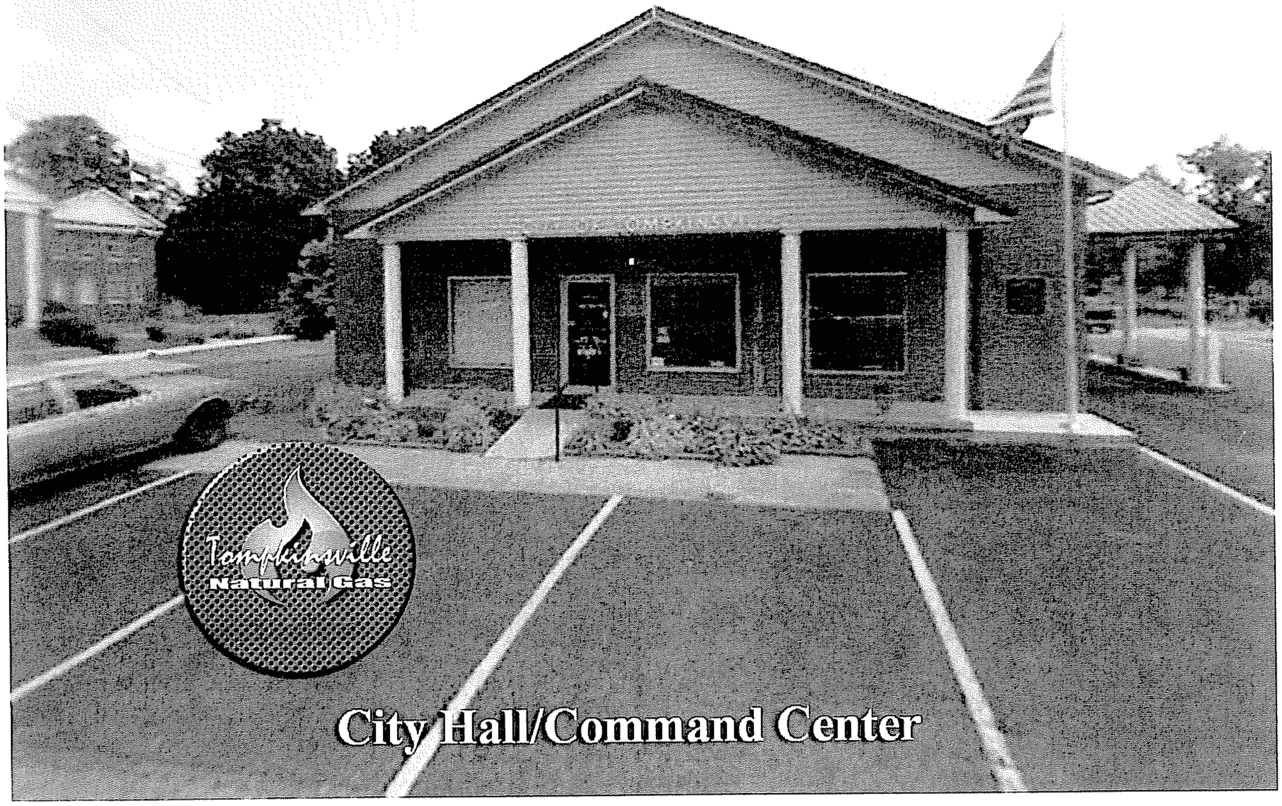
Repair (Long-Term)
This will involve repair work of two types. One type is the permanent repair in areas that were temporarily repaired. The second type is the repair of problems discovered in the damage assessment process.

ASSESSMENT CHECK LIST (INVESTIGATIVE)		
Preliminary Assessment	**Time**	**Remarks**
Number of reported customer outages?		
Are outages localized/widespread?		
How many gas sites are blowing?		
Where are these sites?		
Have gas crews been dispatched to blowing sites?		
How many gas related fire/explosions?		
How many gas related injuries/deaths?		
How many gas related property damages?		
Is this reportable to the Regulatory Authority?		
Is gas available from the supplier?		
What is the forecasted weather?		
Are gas facilities under threat war/civil unrest?		
How widespread is the crisis (local/state/national?)		
Is information coming in from the public?		
Should a Gas Emergency be declared?		
Should the Gas Crisis Team be activated?		

Name		Date	

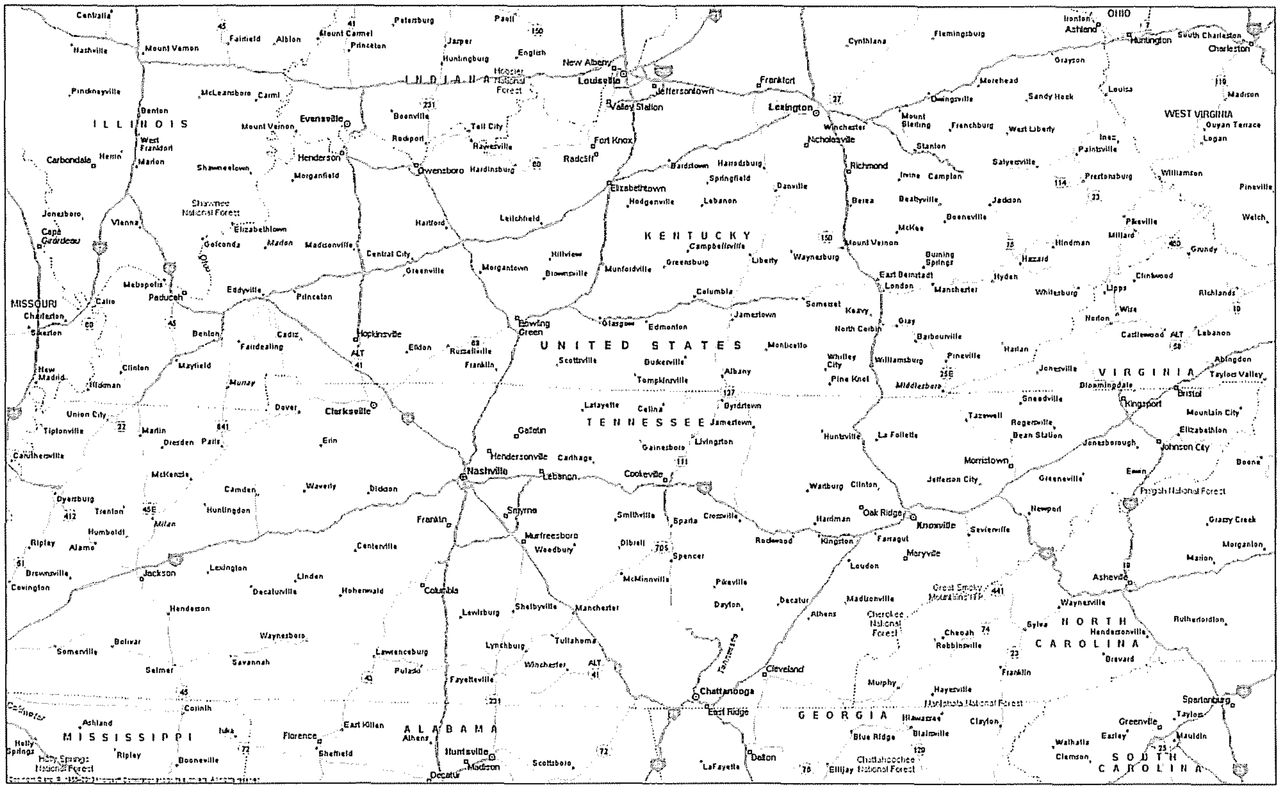
ASSESSMENT CHECK LIST (ACTION TAKEN)		
Preliminary Assessment	**Time**	**Remarks**
How many transmission line are damaged?		
Number of damaged gate stations? Location?		
Number of damaged odorizer stations?		
Number of damaged regulator stations?		
Number of Cast Iron piping damaged?		
Number of over-pressure occurrences?		
Crews/personnel available? Contractor(s)?		
What is communications status (radio/phone?)		
What is communication status SCADA?		
What is transportation status (bridges/roads?)		
Has service been restored to critical facilities?		
What other utilities have been affected?		
What other Gas Crisis Teams have been activated?		
What is status of stores/material?		
What material concerns are there if any?		
Is aerial services available/needed?		
Has EMA activated their EOC?		
Has EMA activated any emergency shelters?		
Has Mutual Assistance Agreement been evoked?		
Can outside assistance get into critical areas?		
Has outside help been issued copy of call list?		
Has in-house personnel been re-assigned?		
Does outside help need food/shelter? Logistics?		
Has law enforcement been updated (crisis?)		
Has fire officials been updated (crisis?)		
Has news media been updated (crisis?)		

Name		Date	

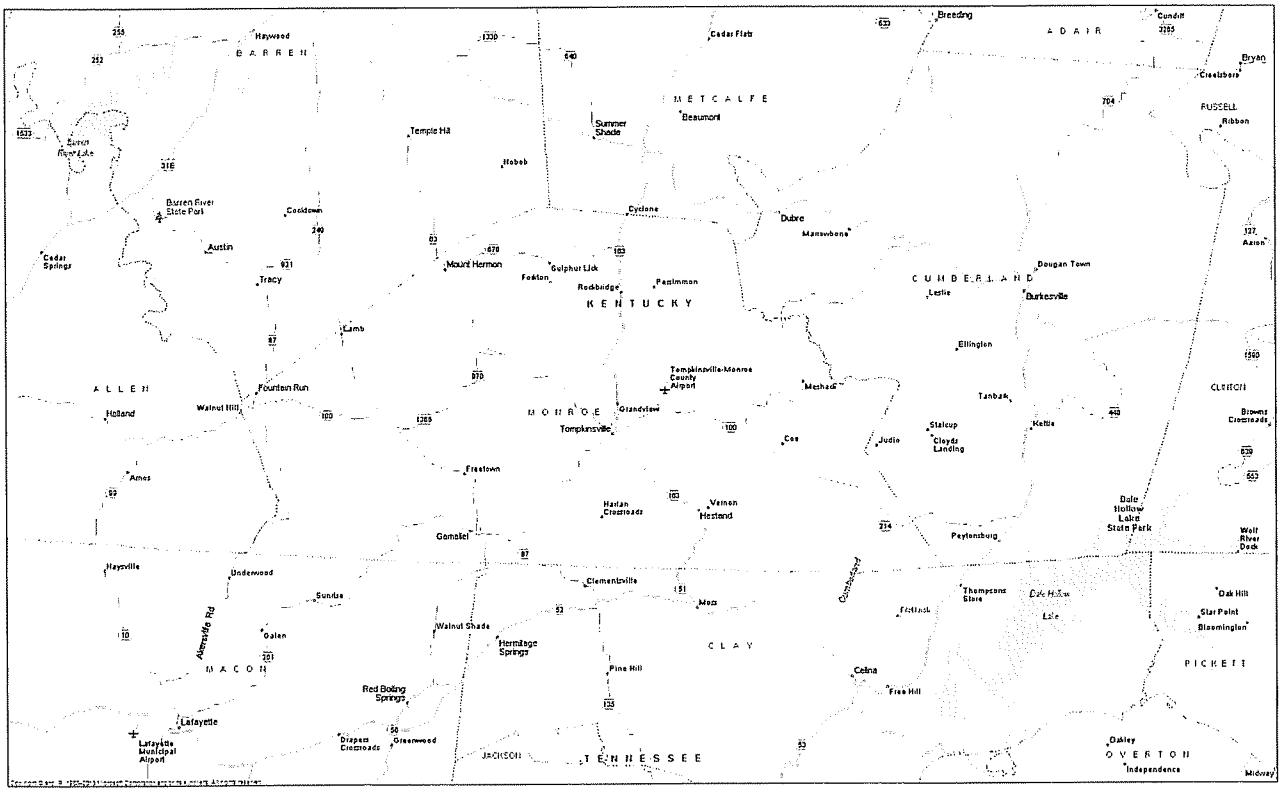


City of Tompkinsville, Kentucky in Monroe County relief routes to and from the area

201 East Main Street
COMMAND CENTER



Logistical Site Location				Assigned Map Number		**5706-001**		
Personnel Manning Site **Gas Dept Personnel** **Fire Dept Personnel** **Police Dept Personnel**	❶			❹				
	❷			❺				
	❸			❻				
Assigned Radio Frequency		Radio #		Mobile Phone #				
Check List/Equipment	Radio	☐ Yes ☐ No	Cell Phone	☐ Yes ☐ No	CGI/EGD/FI	☐ Yes ☐ No		
Check List/Supplies	Batteries/AA/AAA/C/D			First Aid Kit				
	Battery/AC Powered TV			PPE/Clothing				
	Battery/AC Powered AM/FM			Fire Extinguisher				
	Cell Phones (2)			SCBA				
	Hand Held Flashlights (2)			Tools				
Check List/Procedures	System Maps		GPS		Lap Top GIS		Emergency Call List #	

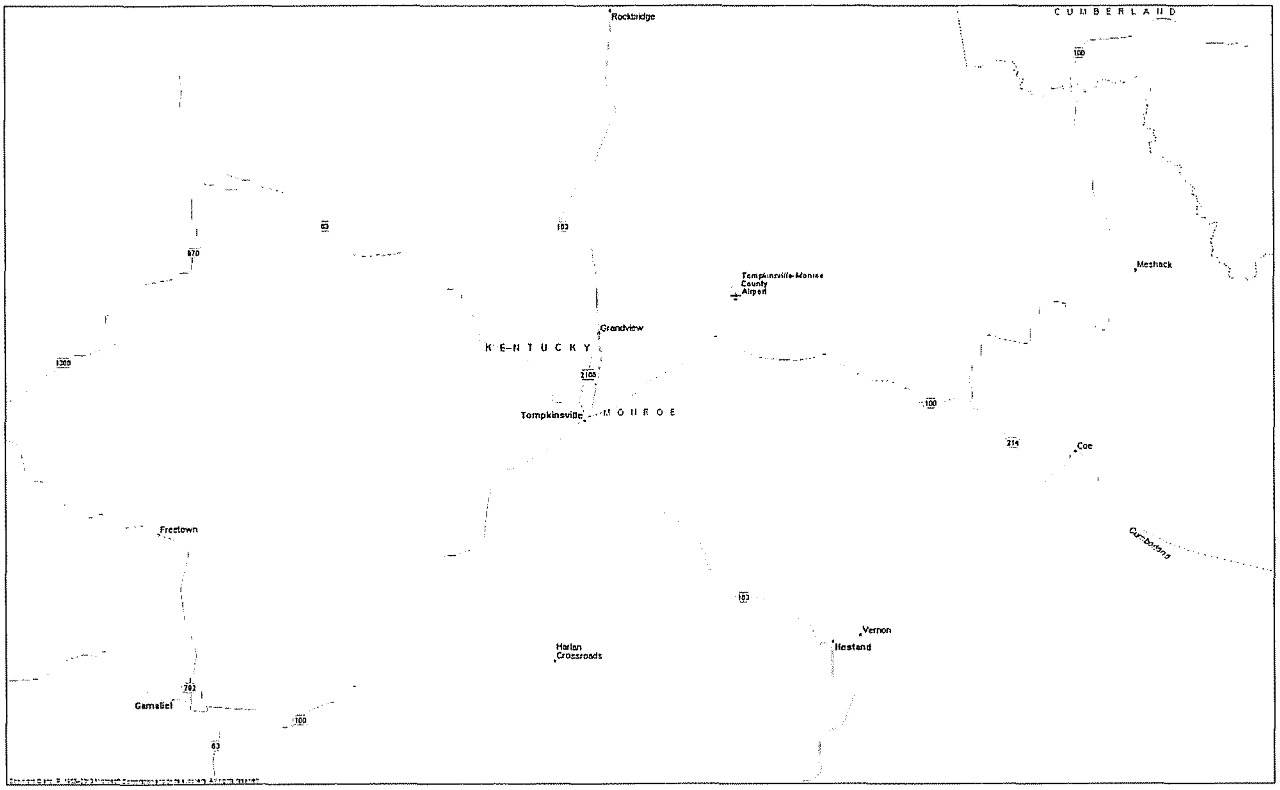


Logistical Site Location		Assigned Map Number	**5706-002**
Personnel Manning Site **Gas Dept Personnel** **Fire Dept Personnel** **Police Dept Personnel**	❶	❹	
	❷	❺	
	❸	❻	

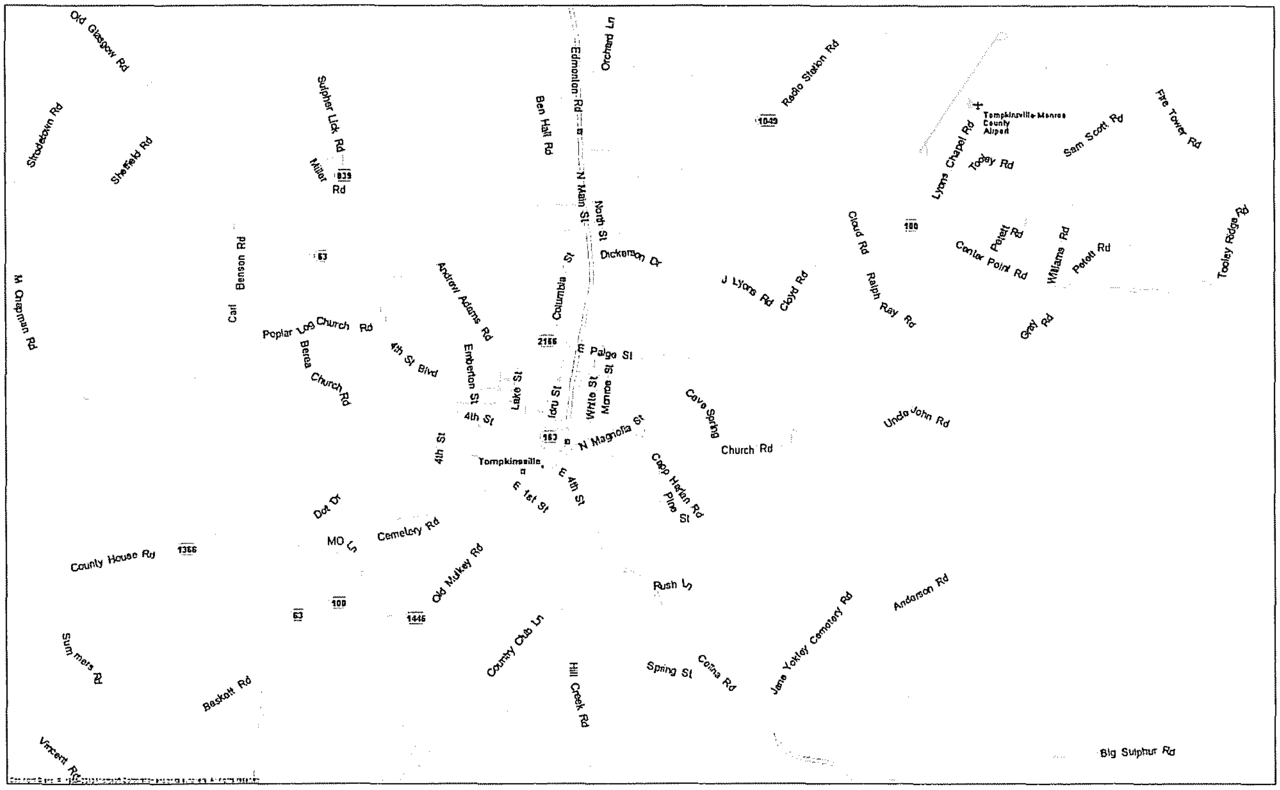
Assigned Radio Frequency		Radio #		Mobile Phone #	
Check List/Equipment	Radio	☐ Yes ☐ No	Cell Phone	☐ Yes ☐ No	CGI/EGD/FI	☐ Yes ☐ No

Check List/Supplies		
	Batteries/AA/AAA/C/D	First Aid Kit
	Battery/AC Powered TV	PPE/Clothing
	Battery/AC Powered AM/FM	Fire Extinguisher
	Cell Phones (2)	SCBA
	Hand Held Flashlights (2)	Tools

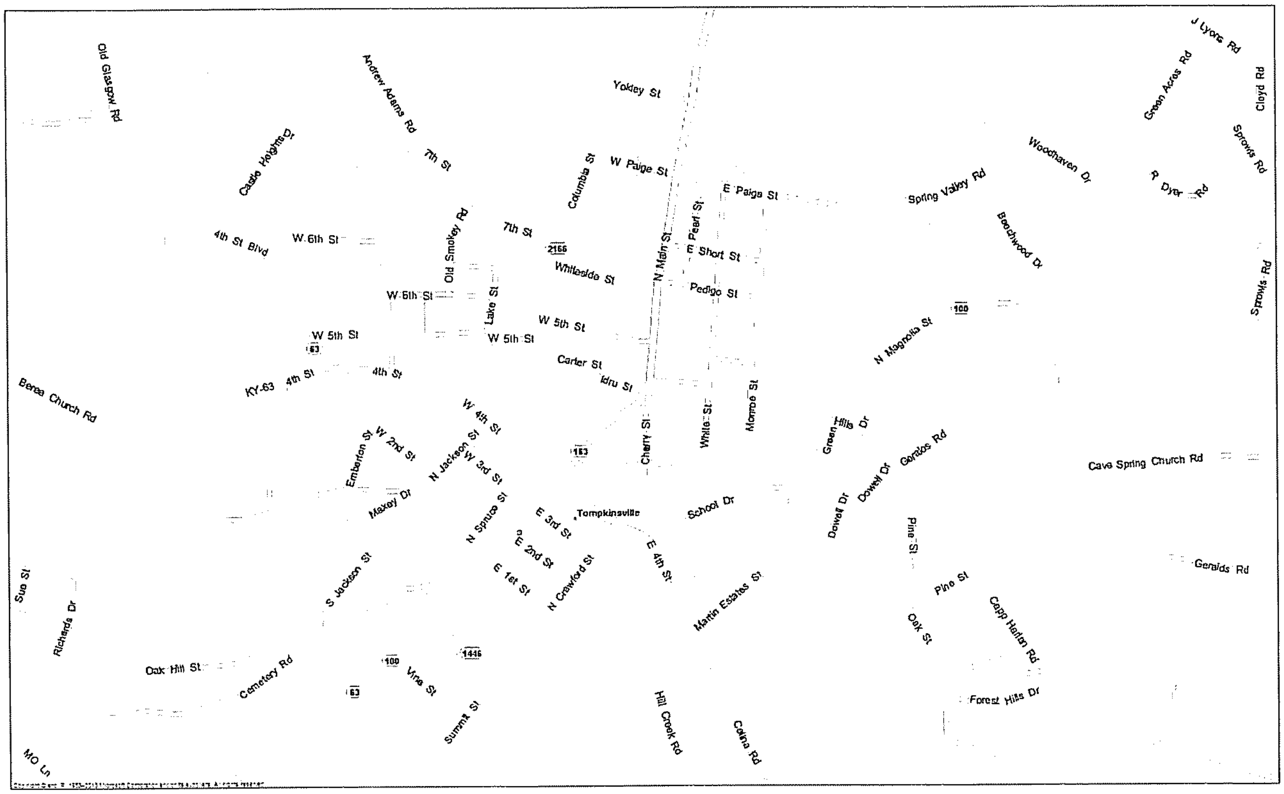
Check List/Procedures	System Maps		GPS		Lap Top GIS		Emergency Call List #	



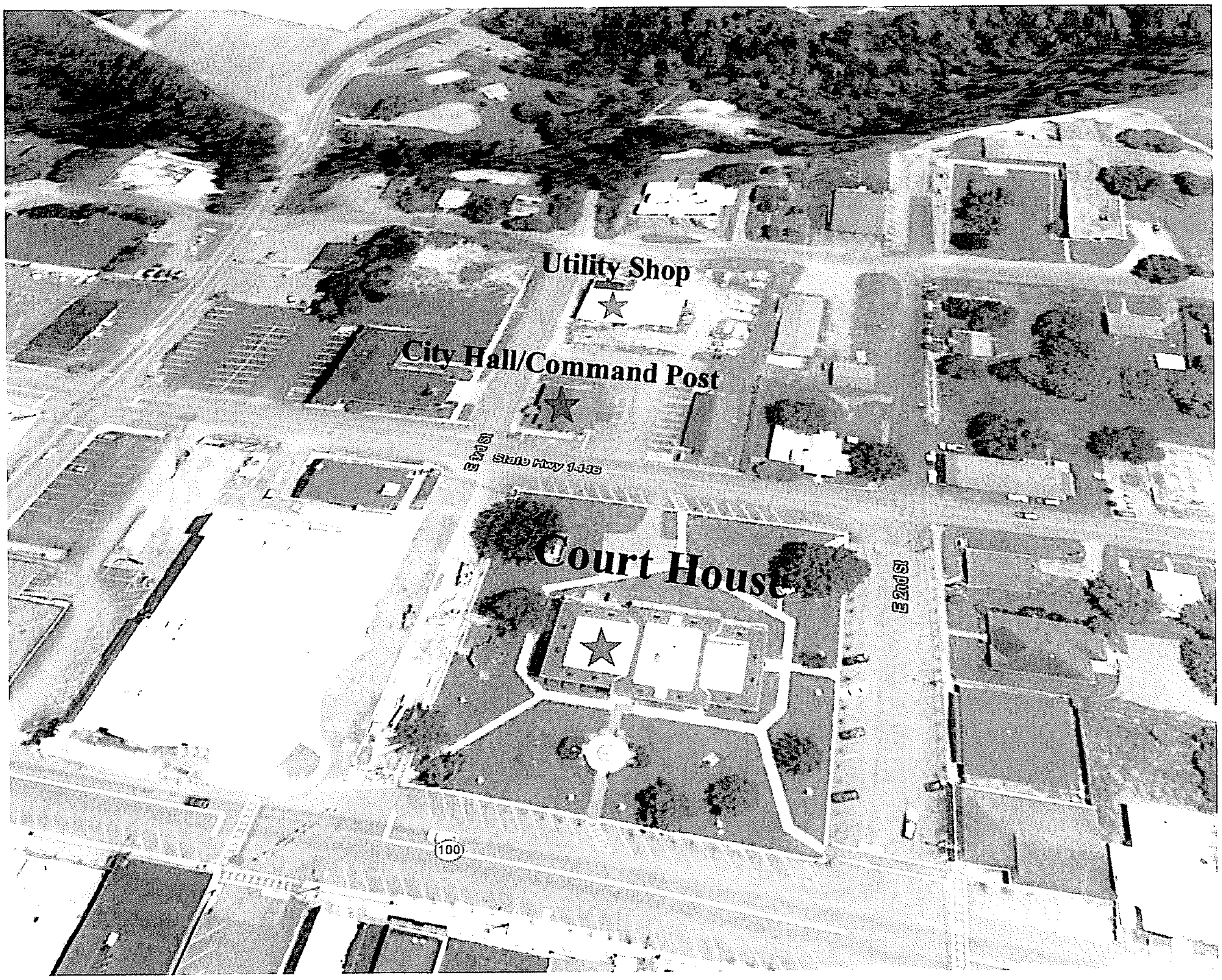
Logistical Site Location					Assigned Map Number		**5706-003**	
Personnel Manning Site **Gas Dept Personnel** **Fire Dept Personnel** **Police Dept Personnel**	❶				❹			
	❷				❺			
	❸				❻			
Assigned Radio Frequency		Radio #			Mobile Phone #			
Check List/Equipment	Radio	☐ Yes ☐ No	Cell Phone	☐ Yes ☐ No	CGI/EGD/FI	☐ Yes ☐ No		
Check List/Supplies	Batteries/AA/AAA/C/D				First Aid Kit			
	Battery/AC Powered TV				PPE/Clothing			
	Battery/AC Powered AM/FM				Fire Extinguisher			
	Cell Phones (2)				SCBA			
	Hand Held Flashlights (2)				Tools			
Check List/Procedures	System Maps		GPS		Lap Top GIS		Emergency Call List #	



Logistical Site Location					Assigned Map Number		**5706-004**	
Personnel Manning Site **Gas Dept Personnel** **Fire Dept Personnel** **Police Dept Personnel**	❶ ❷ ❸				❹ ❺ ❻			
Assigned Radio Frequency		Radio #			Mobile Phone #			
Check List/Equipment	Radio	☐ Yes ■ No	Cell Phone		■ Yes ☐ No	CGI/EGD/FI	☐ Yes ☐ No	
Check List/Supplies	Batteries/AA/AAA/C/D				First Aid Kit			
	Battery/AC Powered TV				PPE/Clothing			
	Battery/AC Powered AM/FM				Fire Extinguisher			
	Cell Phones (2)				SCBA			
	Hand Held Flashlights (2)				Tools			
Check List/Procedures	System Maps		GPS		Lap Top GIS		Emergency Call List #	



Logistical Site Location					Assigned Map Number		**5706-005**
Personnel Manning Site **Gas Dept Personnel** **Fire Dept Personnel** **Police Dept Personnel**	❶				❹		
	❷				❺		
	❸				❻		
Assigned Radio Frequency		Radio #			Mobile Phone #		
Check List/Equipment	Radio	☐ Yes ☐ No	Cell Phone	☐ Yes ☐ No	CGI/EGD/FI		☐ Yes ☐ No
Check List/Supplies	Batteries/AA/AAA/C/D				First Aid Kit		
	Battery/AC Powered TV				PPE/Clothing		
	Battery/AC Powered AM/FM				Fire Extinguisher		
	Cell Phones (2)				SCBA		
	Hand Held Flashlights (2)				Tools		
Check List/Procedures	System Maps		GPS		Lap Top GIS		Emergency Call List #



Key locations within the Tompkinsville Natural Gas System

Strongest AM radio stations in Tompkinsville:

- WTKY (1370 AM; daytime; 2 kW; TOMPKINSVILLE, KY; **Owner:** WHITTIMORE ENTERPRISES, INC.)
- WSM (650 AM; 50 kW; NASHVILLE, TN; **Owner:** GAYLORD ENTERTAINMENT COMPANY)
- WAMB (1160 AM; 50 kW; DONELSON, TN; **Owner:** GREAT SOUTHERN BROADCASTING COMPANY, INC.)
- WLAC (1510 AM; 50 kW; NASHVILLE, TN; **Owner:** CAPSTAR TX LIMITED PARTNERSHIP)
- WKDA (1200 AM; 50 kW; NASHVILLE, TN; **Owner:** RADIO NASHVILLE, INC.)
- WNQM (1300 AM; 50 kW; NASHVILLE, TN; **Owner:** WNQM. INC.)
- WKVL (850 AM; daytime; 50 kW; KNOXVILLE, TN; **Owner:** HORNE RADIO, LLC)
- WHAS (840 AM; 50 kW; LOUISVILLE, KY; **Owner:** CLEAR CHANNEL BROADCASTING LICENSES, INC.)
- WWAM (820 AM; daytime; 50 kW; JASPER, TN; **Owner:** SHELTON BROADCASTING SYSTEM)
- WFLI (1070 AM; 50 kW; LOOKOUT MOUNTAIN, TN; **Owner:** WFLI, INC.)
- WPLN (1430 AM; 15 kW; MADISON, TN)
- WKCT (930 AM; 5 kW; BOWLING GREEN, KY; **Owner:** DAILY NEWS BROADCASTING CO.)
- WHIN (1010 AM; 5 kW; GALLATIN, TN; **Owner:** WHIN, INC.)

Strongest FM radio stations in Tompkinsville:

- WKWY (102.7 FM; TOMPKINSVILLE, KY; **Owner:** J.K. WHITTIMORE)
- WTKY-FM (92.1 FM; TOMPKINSVILLE, KY; **Owner:** WHITTIMORE ENTERPRISES, INC.)
- WSGP (88.3 FM; GLASGOW, KY; **Owner:** SOMERSET EDUCATIONAL BROADCASTING FOUNDATION)
- WVFB (101.5 FM; CELINA, TN; **Owner:** ELIZABETH BERNICE WHITTIMORE)
- WGGC (95.1 FM; GLASGOW, KY; **Owner:** HERITAGE COMMUNICATIONS, INC.)
- WGSQ (94.7 FM; COOKEVILLE, TN; **Owner:** CLEAR CHANNEL BROADCASTING LICENSES, INC.)
- WOVO (105.3 FM; GLASGOW, KY; **Owner:** NEWBERRY BROADCASTING, INC.)
- WLQK (95.9 FM; LIVINGSTON, TN; **Owner:** JWC BROADCASTING)
- WBXE (93.7 FM; BAXTER, TN; **Owner:** JWC BROADCASTING)
- WKYR-FM (107.9 FM; BURKESVILLE, KY; **Owner:** RAY MULLINIX)
- WLCT (102.1 FM; LAFAYETTE, TN; **Owner:** LAFAYETTE BROADCASTING CO., INC.)
- WGBV (94.1 FM; GLASGOW, KY; **Owner:** FOREVER COMMUNICATIONS,INC.)
- WKNK (99.1 FM; EDMONTON, KY; **Owner:** HART COUNTY COMMUNICATIONS, INC.)

TV broadcast stations around Tompkinsville:

WPGD (**Channel** 50; HENDERSONVILLE, TN; **Owner:** TRINITY BROADCASTING NETWORK)

WPBM-LP (**Channel** 48; SCOTTSVILLE, KY; **Owner:** PROCLAIM BROADCASTING, INC.)

Read more: http://www.city-data.com/city/Tompkinsville-Kentucky.html#ixzz20AH2cGp9

It is important to have your heating equipment checked for safe and efficient operation. When gas fired appliances are not operating properly they may become unsafe, three possibilities may exist if left unchecked.
* Fire
* Explosion
* Asphyxiation

Fire: In the event of a natural gas fire, remember to always terminate the gas supply. Once the gas has been terminated the fire can be extinguished. NOTE: Never put out a blowing gas fire, it may reignite the gas again causing an explosion.

Explosion: Explosion of natural gas can occur when it is confined and allowed to build up in volume. The mixture of natural gas and oxygen under confined situations has the ability to be ignited by means of static electricity.

Asphyxiation; natural gas will displace the oxygen in a confined space.
1. Prolonged exposure can numb the sense of smell and give the occupants a false sense of security. Example: "I don't smell it any longer, it must have gone away."
2. The occupants can be overcome. Fresh air, a breathing apparatus or CPR may be used to revive occupants.
3. Carbon monoxide is slightly lighter than air and can collect from the bottom of the room to the ceiling. 35 ppm is the threshold limit for an eight hour exposure before health is endangered.

Signs of carbon monoxide poisoning.
* Headaches
* Dizziness
* Nausea
* Confusion
* Weakness
* Vision or hearing impairment
* Drowsiness

If you suspect carbon monoxide;
* Get fresh air
* Call 911
* Seek immediate medical attention

NOTE: The odorant that is added to natural gas for detection can be stripped of it's smell by soil and other adsorption and absorption materials. If you suspect natural gas is present, do not delay, call your gas company.

NOTE: Carbon monoxide can cause death in 1 to 3 min. We provide 7 days a week, 24 hours a day response to any and all suspect concerns.

EMERGENCY GAS METER SHUT-OFF

Shut-off steps:
Turn the high-pressure riser valve to the off position. This action will terminate the natural gas flow through the meter terminating gas flow to the structure. Figure #1, shows the high-pressure valve on the riser. Figure #2 shows the high-pressure regulator. The regulator receives high-pressure gas from the utility and then reduces the pressure to a quarter PSI G. The gas pressure only outlet side of the regulator is low pressure at that point. Be careful around the regulator. If the regulator were to crack or break it could blow gas with tremendous velocity and could create potential risk to life health and property.

The choice should be based on two questions. One, will the wrench be large enough and provide enough leverage to turn the valve to the closed position. Two, always know where the wrench can be accessed.
Possible wrench selections:
* Pipe Wrench
* Cresent Wrench
* Chanel Locks
* Strong gripping pliers (secure gripping)

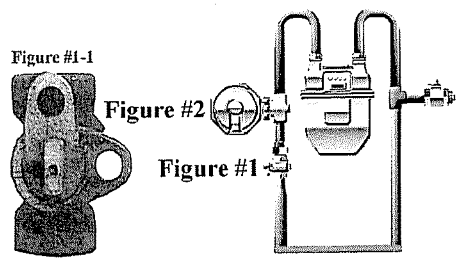


Figure #1-1 shows a riser valve in the "OPEN" position. You will notice the bar of the valve is in line with the run of the pipe. This means the gas flow is feeding the structure. When the bar is turned 90° to the run of the pipe and the two distinctive holes are lined up together, the valve is then in the off position and "NO" flow is entering the structure.

NOTE: In the event the gas needs to be turned off, please, first contact us. Never turn the gas valve back on. It must be turned back on by certified personnel. Call your gas company. We can answer any questions and assist in correcting any gas conc

City of Tompkinsville Public Awareness Plan

THE NATURAL CHOICE

For Emergencies or just calling to ask quaestions, you can contact us at

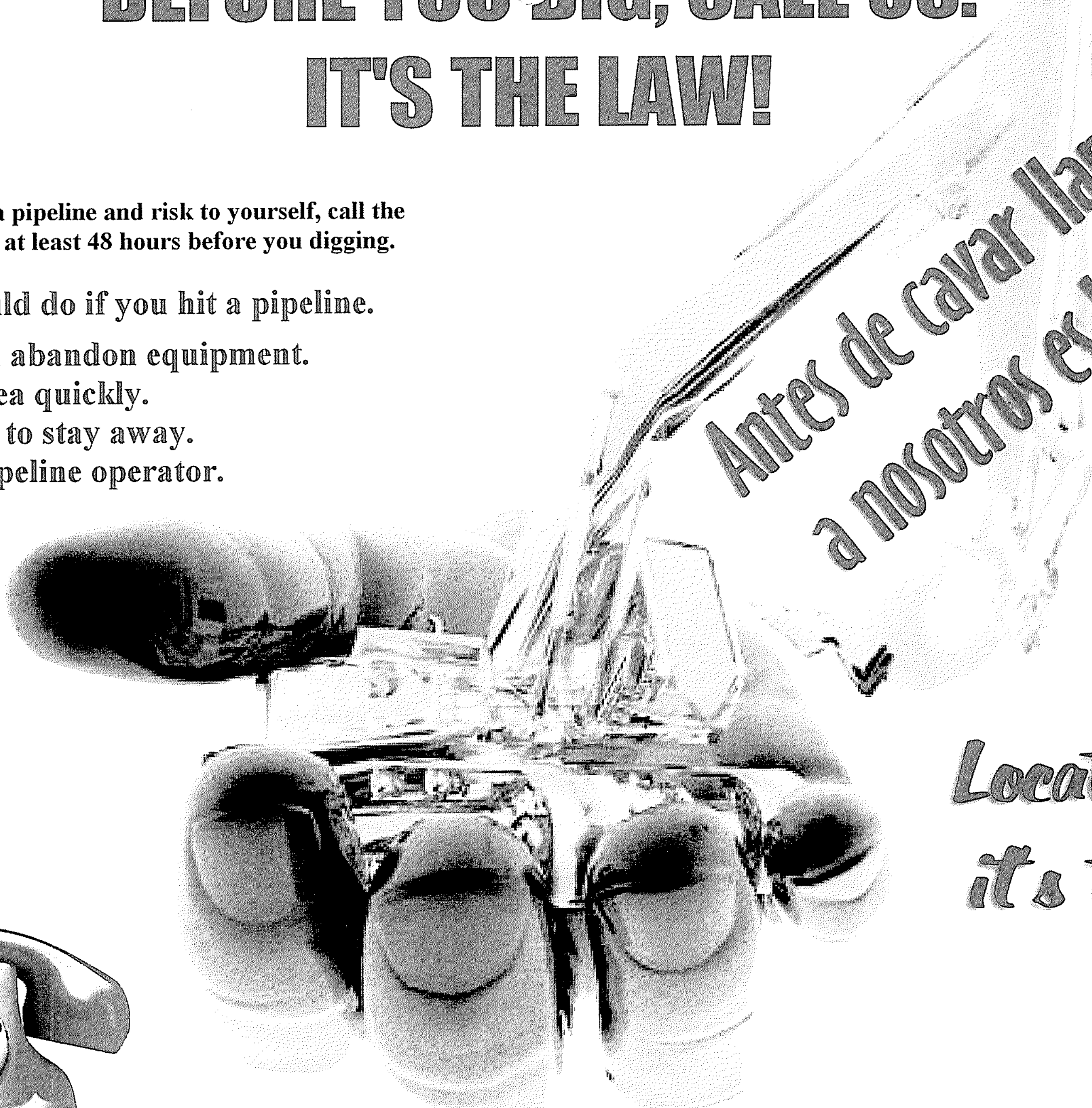
270-487-6776
or after hours
270-487-6191/911

BEFORE YOU DIG, CALL US.
IT'S THE LAW!

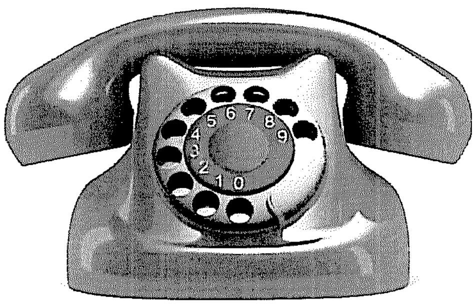
To prevent damage to a pipeline and risk to yourself, call the state One-Call Service at least 48 hours before you digging.

What you should do if you hit a pipeline.

* Turn off and abandon equipment.
* Leave the area quickly.
* Warn others to stay away.
* Notify the pipeline operator.



Locate, before it's too late!



City of Tompkinsville cares about your safety. Call us at 270-487-6776 day time and 270-487-6191/911 after hours.

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DISTRIBUTION INTEGRITY MANAGEMENT PROGRAM

Tompkinsville Gas, Assessment Plan shall be specific in the method(s) used to identify each covered segment. All anomalies associated with specific threats to Tompkinsville Gas shall be identified. The assessment method selected for each covered segment shall address all of the threats identified for the covered segment. Initiation point of Tompkinsville Gas DIMP Plan shall address all applicable threat(s) to it's identified covered segment. The Assessment Plan may also be modified if the operator acquires an understand of the affect covered segment from the initial assessments or from its risk assessments that leads to a change in inspection priorities, assessment methods, or other improvements to its program. Tompkinsville Gas shall document all plan modifications and the reason(s) for the changes. The documentation shall be available for state authority review. All pipeline segments shall be assessed within ten years of identification.

Tompkinsville Gas shall evaluated assessment method(s) selected by evaluating the process methods as detection sensitivity; anomaly classified; sizing accuracy; location accuracy; direct examination; history of tool; ability to inspect full length and full circumference of the section; and the ability to indicate the presence of multiple anomalies.

Measures Used:

Consequence

Observed and determine by investigation after an action or series of events has occurred, or determined by evaluation and analyses as the logical result of a postulated action or condition or series of events.

Consequence is the cumulative, undesirable result of an accident. Consequences are measured in health and safety effects, environmental impacts, loss of property and/or business costs. Consequence descriptions may be qualitative or quantitative estimates of the effects of an accident.

Consequence Analysis

Consequence analysis is the evaluation or analyses of a post action or condition or series of events to determine the logical result. A consequence analysis may be performed to determine the expected effects of events leading to a pipeline accident, independent of the likelihood of such events occurring.

Continual Evaluation of Pipeline Integrity

Pipeline operators must develop programs for conducting periodic pipeline integrity assessments and evaluating the results of those assessments to understand current pipeline conditions and identify integrity issues. This periodic assessment and evaluation cycle a continual evaluation of pipeline integrity.

Cost/Benefit Analysis

A cost/benefit analysis is an evaluation and comparison of an activity's cost to its perceived benefits.

A cost benefit analysis is a determination and comparison of the expected costs to implement a proposed activity and the expected safety, environmental, or other benefits resulting from the activity. Cost/benefit analysis are used to establish priorities among various activities, to compare and select among alternate ways of accomplishing an objective, or to decide whether a proposed activity should be implemented. The various expected benefits of a proposed activity are often translated into dollar values ('monetized') to allow different types of benefits to be combined and then compared with the costs of achieving these benefits. Cost/benefit analysis is used by regulators to justify new regulations, and by operators to define and allocate resources to operational and maintenance activities.

Cost/Benefit Ratio

A cost/benefit ratio is the ratio of the cost of performing an activity compared to the benefits of performing it.

The monetary costs required to complete a proposed activity (for example, replacing a section of pipe) divided by the monetized value of the benefits expected to be derived from that activity (for example, decreased pipe leak rate or likelihood of rupture). Cost/benefit ratios are used as an input to determine and proceed with the proposed activity.

Failure

Failure is a human, structure, component, device, or system that fails to adequately perform its intended purpose.

When a pipeline that is actually leaking is the most obvious indication of failure, failure is the point at which the pipe material is stressed beyond its elastic or yield point. At that point the material is deformed and does not return to its original shape. A pipeline rupture is an example of this type of failure.

Failure Frequency

Failure frequency is the rate at which failures occur.

The number of failure events that occur divided by the total elapsed calendar time during which those events occur or by the total number of demands, as applicable.

Failure Probability

Failure probability is the probability that a failure will occur.

Failure probability is the probability that a structure, device, equipment, system, will fail on demand or will fail in a given time interval, expressed as a value from 0 to 1.0

Failure Rate

Failure rate is the rate at which failures occur.

Failure rate is the number of failure events that occur divided by the total elapsed operating time during which those events occur or by the total number of demands.

Hazard

Hazard is a condition or substance that has the potential to produce harmful effects.

Hazard and Operability Analysis (HAZOP)

A hazard and operability analysis is the systematic method for evaluating hazards. It often involves the review of detailed system drawings, specifications, and operating procedures. Process hazards and potential operating problems are identified through a qualitative investigation of deviations from normal process conditions.

High Consequence Area (HCA)

A high consequence area is a location that is specially defined in pipeline safety regulations as an area where pipeline releases could have greater consequences to health and safety or the environment. HCAs include high population areas, other population areas, and areas unusually sensitive to environmental damage. Regulations require a pipeline operator to take specific steps to ensure the integrity of a pipeline for which a release could affect an HCA and, thereby, the protection of the HCA.

High Population Area

A high population area is an urbanized area, as defined and described by the U.S. Census Bureau, which contains 50,000 or more people and has a population density of at least 1,000 people per square mile. High population areas are considered high consequence areas.

High Pressure Distribution System

A high pressure distribution system is a natural gas distribution system in which the gas pressure in the main is higher than the pressure at which gas is provided to the customer. (Reference 49CFR 192.3).

Likelihood

Likelihood refers to the probability that something possible may occur. The likelihood may be expressed as a frequency (e.g., events per year), a probability of occurrence during a time interval (e.g., annual probability), or a conditional probability (e.g., probability of occurrence, given that a precursor event has occurred).

Operator

An operator is a person who engages in the transportation of gas (Reference 49CFR 192.3) or a person who owns or operates pipeline facilities (Reference 49CFR 195.2). 'Person' in this case means any individual, firm, joint venture, partnership, corporation, association, State, municipality, cooperative association, or joint stock association, and including any trustee, receiver, assignee, or personal representative thereof.

Other Populated Area

Other populated area is a place, as defined and described by the Census Bureau, that contains a concentrated population, such as an incorporated or unincorporated city, town, village, or other designated residential or commercial area.

Outside Force Damage

Outside force damage is damage to an underground facility, such as a pipeline, resulting from some external force acting on the facility. Outside force damage to a pipeline or its protective coating is most often associated with damage from excavation activities around the buried pipe as a result of excavation equipment hitting the pipe, or from agricultural practices such as deep plowing or drainage tile installation. Outside force damage can usually be prevented by calling the one-call center before digging, waiting for the underground facility location to be marked, and excavating carefully while respecting the locate marks.

Ground movement from landslides, subsidence, or seismic activity can also exert damaging external loads on a pipeline. Ground movement is not considered as an outside force damage.

Performance Measures

Performance measures are parameters or information that can be collected and evaluated to determine if a program of action is accomplishing its intended purpose. Federal pipeline safety regulations require that pipeline operators establish performance measures as part of their distribution integrity management programs.

Pipeline

Used broadly, pipeline includes all parts of those physical facilities through which gas, hazardous liquid, or carbon dioxide moves in transportation. Pipeline includes but is not limited to: line pipe, valves and other appurtenances attached to the pipe, pumping/compressor units and associated fabricated units, metering, regulating, and delivery stations, and holders and fabricated assemblies located therein, and breakout tanks. Reference 49CFR 192.3 and 49CFR 195.2

Pipeline Component

A pipeline component is some feature or part of a pipeline, such as pipe, valves, fittings, flanges, closures, tees or cathodic protection.

Pipeline Facility

A pipeline facility is: ❶ New and existing pipelines, rights-of-way, and any equipment, facility, or building used in the transportation of gas or in the treatment of gas during the course of transportation (Reference 49CFR 192.3); and ❷ New and existing pipe, rights-of-way and any equipment, facility, or building used in the transportation of hazardous liquids or carbon dioxide. (Reference 49 CFR 195.2)

Probability

Probability is a measure, either qualitative or quantitative, of the likelihood that an event will occur within some unit of time.

Probability Analysis

Probability analysis is an evaluation of the probability of occurrence of specific events, such as an analysis of the probability of certain pipeline failures.

Public Cost of Incident

The public cost of an incident is defined as public and private (non operator) costs for the incident.

Qualitative Risk Analysis

A qualitative risk analysis is an analysis of hazards to determine which ones should be of most concern to address in preventing an accident.

Qualitative risk analysis is a disciplined analysis of the event sequences that could transform a potential hazard into an accident.

The process is used to identify and assess risks (Fishbone Analysis)(Target Charts)to determine which ones should be of most concern. The identified hazards can then be ranked according to risk, allowing preventive and mitigative measures to be prioritized and taken to prevent accidents.

Quantitative Risk Analysis

A quantitative risk analysis is a numerical analysis of risks.

A quantitative risk analysis is a process of hazard identification, followed by numerical evaluation of incident consequences and frequencies, and their combination into an overall measure of risk. Often associated with expressions of absolute risk but can also include methods expressing risk in relative terms, such as a score.

Relative Risk Index Model

A relative risk index model is an analytical model or tool that is used to calculate a numerical score, representing the relative risk of a pipeline segment. This score is calculated based on variables that represent characteristics of the pipeline segment and the perceived importance of these characteristics to the risk of the segment.

Reliability

Reliability is the likelihood that a component or system will continue to perform its intended function.

Reliability Analysis

A reliability analysis is the determination, through evaluation and analysis, of the probability or likelihood that a component will perform its required function in the desired manner under all relevant conditions. It includes the analysis of potential failures that could render the component unable to perform its normal required functions.

Risk

Risk is a measure of both the likelihood that an adverse event could occur and the magnitude of the expected consequences should it occur.

Risk Assessment

A risk assessment is a comprehensive evaluation of the pipeline system to identify hazards, likelihood and consequences of potential pipeline incidents or accidents. A pipeline risk assessment should provide a significant understanding of pipeline risks and significant risk contributors. (Sometimes referred to as risk analysis or risk evaluation.)

Risk Factors

Risk factors are contributing factors that can influence the likelihood and/or consequence of a pipeline accident.

Risk Management

Risk management is the process by which an organization understands and makes decisions about its risks.

Risk Reduction

Risk reduction is the act of making changes to controllable factors (e.g., operating pressure, patrol frequency) to reduce risk. Risk reduction can also refer to a quantitative measurement of the magnitude of a reduction in risk.

Risk-Benefit

Risk-benefit is an integral part of Risk Management that simultaneously considers and compares risk and the financial costs/savings of risk reduction.

Root Cause

Root cause is the basic, underlying causal factor in an accident or other event scenario which if removed would have prevented the accident or event from occurring.

Root Cause Analysis

Root cause analysis is a problem solving process that focuses on the task of finding the root cause and determining the best prevention solutions to a problem.

Serious Pipeline Incident

PHMSA defines a serious pipeline safety incident as an event involving a fatality or injury requiring in-patient hospitalization.

Significant Pipeline Incident

Significant Incidents are those incidents reported by pipeline operators when any of the following conditions are met: ❶ Fatality or injury requiring in-patient hospitalization. ❷ $50,000 or more in total costs, measured in 1984 dollars. ❸ Highly volatile liquid releases of 5 barrels or more or other liquid releases of 50 barrels or more. ❹ Liquid releases resulting in an unintentional fire or explosion. **Serious incidents**, a subset of Significant Incidents, are incidents which involve a fatality or injury requiring in-patient hospitalization.

Supervisory Control and Data Acquisition System

A SCADA is a pipeline control system designed to gather information such as pipeline pressures and flow rates from remote locations and regularly transmit this information to a central control facility where the data can be monitored and analyzed. Through this same system, the central control facility can often issue commands to the remote sites for actions such as opening and closing valves and starting and stopping pumps.

Third Party Damage Prevention

Third-party damage prevention includes all efforts and programs designed to prevent outside force damage to underground facilities (e.g., pipelines) that can occur during excavation activities. Responsibility for preventing underground facility damage is shared by all stakeholders. Advanced planning, effective use of one-call systems, accurate locating and marking of underground facilities, and the use of safe-digging practices can all be very effective in reducing underground facility damage.

See Also: Damage Prevention Initiatives, Damage Prevention Regulations, Outside Force Damage, External Force Damage

Throughput

Throughput is a measurement of the amount of natural gas flowing through a pipeline.

Total Cost of Incident

Total cost is the total property damage as reported on the operator-filed incident report.

Tompkinsville Gas shall be established and maintained as a pipeline history system and shall be directed towards damage prevention. This done so as to eliminate current and future anomalies.

This program shall provide the nine essential elements:

1. More effective communications between the operator and excavators.
2. Notification of stakeholders in all phases (enforcement, system improvement, etc.) of the program.
3. Operator's use of performance measures for persons performing locating of pipelines and pipeline construction.
4. Employee training.
5. Operator's compliance in public education.
6. Enforcement agencies' role as partner and facilitator to help resolve issues.
7. Fair and consistent enforcement of the law.
8. Cultivate engineering and technology information to implement all effected process.
9. Analysis the data to continually evaluate/improve program effectiveness.

Written Program

1. Purpose/Objective/Scope
2. Responsibilities
    *Organizational Chart
    *Approval and Sign Off
3. Knowledge of the System
4. Identify Threats
5. Evaluate and Risk Ranking
6. Risk Management Actions
7. Performance Measurement
8. Periodic Program Evaluation
9. Periodic Reports
10. Recordkeeping
11. Mechanical Failure Report

Operating and Maintenance Plan (as provided)(Maintenance History)

* Trends
* Projections

Pipeline History/Knowledge

1. Current Pipeline History (Present)
2. Identify What You Need to Know
   * Identify Collect Process
   * Normal Measures to Collect Info (Exposed Pipe Report)
3. DIMP Implementation (New Pipe Installation)
   * Location
   * Material
   * Type of Construction
   * Operating Conditions
   * Collect all available Information about the System
   * Update Information as Required
   * Collect Information as to the Activities in and to the System (Records)
     a. Pipe Repair History
     b. Fitting Repair/Replacement History
     c. Welds
     d. Installation(s) Mains/Services
     e. Abandonment/Deactivation
   * Maintenance History
     a. Trends
     b. Projections
   * Review Operating and Maintenance Procedure Schedule Requirements (192 compliance)
   * Data gathered through Operating and Maintenance actives: As seen here.

1 year	**The appropriate personnel shall review Emergency Procedures on an annual basis, not to exceed fifteen months.** If revisions are necessary, new copies of this manual will be distributed.
2 part **1 mo** **1 week**	All natural gas distributed to the gas customer will be odorized sufficiently to be detectable at concentrations in air of one-fifth the lower explosive limit by a person with a normal sense of smell. The odorant used will not be toxic to breathe or damaging to persons, materials, or pipe. It will not be soluble in water by more than the ratio 2.5 to 100 parts by weight. **To insure proper odorant concentration, odorant detection tests shall be performed at each check point monthly using the odorator/odorometer. Odorization equipment at each regulator station shall be visually examined weekly for proper operation and appearance.** For the Operator's Gas System approximately 5/10 to seventy five hundreds of a pound of odorant is needed in order to obtained the correct level for the system. Any abnormal condition found shall be corrected and documented.
2 mo	**Impressed Current Areas** **Bimonthly - Inspect rectifier and check rectifier voltage and current outputs six (6) times each calendar year with intervals not to exceed 2-1/2 months.** **Annually - Potential survey at all monitoring points within all areas of the Operator's Systems shall be tested once each calendar year with intervals not to exceed fifteen (15) months.**
1 year	**Galvanic Anode Areas** **Annually - Potential survey at all monitoring points within each area once each calendar year with intervals not to exceed fifteen (15) months.**

1 year	**Isolated Main Sections (not in excess of 100 feet)** **Annually - Potential survey of not less than ten percent of such sections distributed over the entire system. Surveys must be scheduled in such a manner that a different ten percent will be tested each calendar year so that all sections will be tested at least once in each ten (10) year period.**
1 year	**105.24 Isolated Components, Services** **Annually - Potential survey of not less than ten percent of isolated components and ten percent isolated services distributed over the entire system. Surveys must be scheduled in such a manner that a different ten percent will be tested each calendar year so that all such components and services will be tested at least once in each ten year period.**
2 part **1 year** **4.5 mo**	**Casings** **Annually - Potential survey of metallic casings and the steel piping passing through the casing that is under cathodic protection must be tested at least once each calendar year, but with intervals not exceeding 15 months, to determine whether the cathodic protection meets the requirement of CFR 49, 192.463.** Records of tests will be forwarded to the Gas Operator. If the two readings at a location are similar, additional inspections and tests may be made to determine whether the line pipe is electrically isolated from, or shorted to, the casing. When the readings or tests show the casing to be shorted to the line pipe, one of the following courses of action must be followed and performed by either the Gas Operator representative or a Corrosion Control Technician: **a.** Clear the short. **b.** Fill cavity between casing and carrier pipe with high dielectric casing filler. **c.** **Monitor the casing with leak detection instruments at intervals not exceeding 4-1/2 months.** If a leak is detected, it should be reported and immediate corrective action must be taken.
3 year	**Monitoring Atmospheric Corrosion** **Above ground natural gas piping exposed to the atmosphere and installed after July 31, 1971 shall be visually inspected at intervals not exceeding 36 months.** If atmospheric corrosion exist on above ground metallic piping then remedial action shall be taken to protect the integrity of the material. Surveys may utilize leak survey crews and meter readers to identify localized or general corrosion on above ground piping. Close inspection should be made where clamps, rest plates, sleeved openings, and air to soil bacterial areas exist. Corrosion surfaces shall be properly cleaned and stripped of all active corrosion and properly prepared for coated using approved coating and protective materials. **NOTE:** Reference guide for proper protective coating can be found in "Good Painting Practices (Volume 1 and 2) which is published by the Steel Structures Painting Council."

2 part **2 weeks** **1 year**	**Patrolling (Transmission Lines)** If required, all gas lines operating at a hoop stress of 20% and above of the specified minimum yield strength shall be patrolled by air at low level. **The patrol should be made biweekly, but under no circumstances shall the frequency of aerial patrol be less than once per month.** The pilot shall be alert for any physical activity on or near the right-of-way, any dead vegetation which would indicate leakage, and any erosion of the earth near the pipeline. The pilot shall pay particular attention to pipeline crossings of rivers, streams, roadways, and railroads. Any irregular activity of a serious nature will be radioed to the pilot's controller who will notify the Gas Systems Operator by telephone. The Gas Operator shall take action to assure proper investigation of the report. All other activity along the right-of-way will be reported in letter form. **All transmission pipelines in right-of-way considered to be cross country or cross city shall be patrolled by foot at least once each year to detect leaks, check on right-of-way encroachments or other activity, and determine maintenance needs.** A minimum right-of-way of 15 feet shall be maintained on all pipelines.
2 part **3 mo** **4.5 mo**	**Patrolling (Distribution Lines)** The frequency of patrolling shall be determined by the severity of the condition which could cause failure or leakage and the consequent hazards to public safety. The Gas Operator shall keep records of all mains exposed to the atmosphere, (except for gate and district regulators which are covered in this manual) and mains located in places or on structures where potential physical movement or external loading could cause failure or leakage. **Mains exposed to the atmosphere will be monitored at intervals not exceeding three (3) years. Mains subject to anticipated movement or external loading which may result in failure or leakage, will be patrolled at intervals not exceeding 4-1/2 months (see the bridge inspection form located in Appendix IV, "Inspection of Gas Mains on Bridges"). These records will include:** **(1) Location** **(2) Location of pipe** **(3) Length of bridge or span** **(4) Length of pipe exposed** **(5) Pipe size** **(6) Type of hangers** **(7) Distance between hangers** **(8) Condition of hangers** **(9) Pipe properly supported** **(10) Paint condition** **(11) Coating condition** **(12) Condition of expansion joints (if any)** **(13) Condition of pipe at bridge piers/abutments** **(14) Signs of electrical shorts or friction** **(15) Need of protective post at bridge ends** **(16) Detection of gas leakage** **(17) Any sign of bridge movement which could cause unanticipated movement or external loading that could cause failure or leakage. (see note*)** **(18) Follow up recommendations** **(19) Priority (when work will be completed)** **(20) Inspectors signatures**

1 year	**Downtown District/Leak Survey** **A combustible gas indicator or Flame Ionization Unit survey using either mobile or walking of all gas, electric, water, telephone, and sewer manholes in the downtown district shall be conducted at least once each year.** This survey will check all openings and cracks encountered in the streets. A map depicting the boundaries of the downtown district shall be accessible with the Gas Operator and shall be updated. All leaks determined to fall within the **Grade "1"** category shall be reported by the surveyor immediately to the responsible personnel. The responsible personnel shall dispatch a repair crew at once to the location of the leak. The crew shall repair the leak or, after investigation by barhole survey or other appropriate means, reclassify the leak and notify the responsible personnel who will schedule the repair at a later date. If the surveyor discovers an explosive mixture in any manhole, he/she shall report this condition to the responsible personnel, who will notify the appropriate owner of the manhole by telephone, and later by letter, of the dangerous condition. The condition reported in the letter will be in effect until the repair crews have eliminated the hazard. The appropriate party shall be notified by letter after the leakage has been stopped. All leaks judged to be in the **Grade "2"** category shall be reported by the leak surveyor at the end of the workday. These leaks will be given to the appropriate responsible personnel who shall schedule repair work within a reasonable length of time. This time shall be governed by the leak location (Class Location). Grade 3 leaks shall be reported and scheduled similar to Grade 2 leaks, but should be scheduled after Grade 1 and 2 leaks have been repaired.
1 year	**Business Districts Other Than the Downtown District** (A) Areas where the majority of buildings on either side of the street are utilized for business use, such as, retail, wholesale, office, or service. (B) Areas where the majority of buildings on either side of the street are high occupancy multistory buildings or buildings with multiple businesses that share common walls. (C) Areas where gas facilities are under continuous paving that extends from the center line of the street to the building wall. **There shall be a combustible gas indicator survey of all manholes and street openings in these sections at least once each year.** The surveyor shall be familiar with areas where the gas mains are located in easements and shall survey the easements, particularly those in suburban shopping centers. Alternatively, the survey may be conducted with flame ionization equipment using either a FI back pack unit or, where the mains are accessible, a mobile unit. The leaks detected shall be reported and repaired in accordance with the provision outlined in 112.23, "Downtown District".
5 year	**Residential and Rural Districts (Outside Business Districts)** **Geographical areas for the purpose of surveying one area a year on a rotating basis may be changed from year to year because of growth or due to unaccounted for gas either high or unusual, but the area shall not be changed in which this action would prevent one-fifth of the gas distribution system from being surveyed each year so as to survey the entire gas system in four (5) years.** Additional surveys may be conducted at the discretion of the Gas Operator. The leaks detected shall be reported and repaired in accordance with the provisions outlined in Section 112.23, "Downtown District".

1 year	**Buildings of Public Assembly** **Buildings of public assembly that are within a hundred (100) feet of a gas main or service (regardless of whether the building has a gas service) shall be surveyed annually with either a combustible gas indicator, using the bar hole method, or a flame ionization back pack unit.** A building of public assembly is defined as one that regularly accommodates more than a hundred (100) people for economic, educational, health, religious, recreational, entertainment, or dining purposes. Buildings of public assembly include, but are not limited to, the following: **(A) Schools, colleges, and universities** **(B) Hospitals** **(C) Nursing and convalescent homes** **(D) Churches** **(E) Child care facilities** **(F) Restaurants** **(G) Theaters** **(H) Night clubs** **(I) Enclosed sports/entertainment arenas** **(J) Museums** **(K) Fairgrounds, amusement parks, and tourist attractions** **(L) Convention centers** **(M) Governmental assembly buildings** **(N) Hotels and motels (with meeting room facilities)** **(O) Malls and shopping centers** **(P) Department stores** **(Q) Supermarkets**
1 year	**Annual Inspections/Regulators** **Once each calendar year, at intervals not to exceed fifteen (15) months, each regulator, flow control device and accompanying equipment shall be routinely inspected.** During the inspection, regulators will be inspected for lock-off, controllers should fully open and close valves, and proper set points shall be verified. Appropriate steps shall be taken to correct or repair any malfunctions that are found. The inspection shall follow a procedural checklist which, upon completion, shall be dated and signed by the responsible personnel and recorded.
3 year	**Major Inspections/Regulators** **Major inspection on flow control devices shall be performed on an as-needed basis. All other regulators such as (industrial regulators) and accompanying equipment shall be subjected to an inspection every 36 months, not to exceed forty-two (42) months.** During this inspection, the equipment shall be disassembled and all parts carefully examined for wear or defect. Any parts found to be defective shall be replaced and properly adjusted. This inspection shall proceed according to a procedural checklist which, upon completion, shall be dated and signed by the responsible personnel and recorded.
3 year	**Regulators/Large Commercial and Industrial Customers** **Regulators supplying large commercial and industrial customers and which are owned by the Gas Operator shall be given a major inspection every 3 years, or more frequently if operating conditions dictate.** The inspection, when possible, shall coincide with the customer's shutdown for plant maintenance or by-passed by experienced personnel. These inspections shall follow the procedure set forth for gate stations and district regulator installations. Regulators owned by the customer are not subject to inspection or maintenance by the Gas Operator.

As needed	**House Service Regulators** **Regulators supplying residential customers shall be inspected for proper operation each time the customer's gas meter is changed and each time a service call is made to a customer's house due to a malfunction of the Gas Operators equipment. Note: Normally, a malfunctioning regulator should be replaced rather than repaired on site.**
1 year	**Safety Relief Valves** **Safety relief valves at gate stations and district regulator stations shall be inspected once each year, at intervals not to exceed fifteen (15) months.** The set point of the relief valve shall be confirmed at the time of the annual inspection. **Relief settings shall be established at and not exceeding 10% above delivery pressure.**
1 year	**Transmission Valves** **All valves in gas mains classified as transmission lines valves or primary valves shall be annually inspected, serviced, and operated without interfering with the operation of the system.** Records of inspection and maintenance of transmission valves shall be kept in the same method as outlined below in distribution valves procedure (see 114.3, "Distribution Valves").
1 year	**Gas Distribution Valves** **Control valve definitions are as follows:** (1) All valves four (4) inches or larger in size that are used to provide safe operation of the system. Valves on the end of a gas line that are to be used for future extension are not considered control valves. (2) All numbered valves, regardless of size. (3) All underground valves, regardless of size, at the inlet to regulator stations. (4) All numbered valves, regardless of size, coming off lines four (4) inches or larger in size (except tap valves in series with a numbered plug valve). (5) Any other valves which are deemed critical in the event of an emergency because of the configuration of the downstream system. **All mainline or service control valves shall be designated for the safe operation of the system and shall be inspected at least once each calendar year.** These inspections shall consist of cleaning the valve boxes, operating the valve as much as possible and servicing as necessary. The inspection of each valve shall include verification of the valve's location and the presence of a valve box over the underground control valve. If a location correction is necessary, a record showing the correct location shall be completed and filed with the Gas Operator. If the valve box is not of the proper type, it shall be scheduled for changing of the valve box or cover. A record of each inspection shall be kept by the Gas Operator.

1 year	**Employee Training/Emergency Procedures Training** **An employee meeting shall be scheduled at least once each calendar year for the purpose of discussing and training of employees in emergency procedures.** **The employee training and discussions shall include the following: Also see Review of Abnormal Operating Conditions.** **1. Review of emergency procedures.** **2. Review of location and use of emergency equipment.** **3. Review of location and use of system maps, service and valve records, etc.** **4. Review of actions, step by step, to be taken in a hypothetical emergency situation.** **Records of attendance at each meeting shall be kept on file.**
1 year	**Public Education/Communications** There shall be a continuing education program to enable customers, the public, appropriate government agencies, and persons engaged in excavation activities to recognize a gas emergency for the purpose of reporting it to the Gas Operator. CFR 49, 192.616. **The meeting shall be held once each calendar year, but not to excess 15 months.** The following is a minimal list of information to be supplied: **1. Information about gas.** **2. Recognition of gas odor.** **3. What to do and what not to do when a strong gas odor is detected.** **4. Necessity of notifying the Gas Operator prior to excavating or performing excavation-related activities. (One-Call System.)** **5. Telephone number to call for information or to report an emergency.** Information may be conveyed to the public by radio, television, newspaper, meetings, public talks, bill stuffers, mailings, and/or handouts. A record of the public education program and related activities shall be maintained by the Gas Operator.
3 year	All transmitters shall be given a visual inspection and pressure check (at operating pressure) annually. Calibrations are to be performed as needed, with a **maximum interval between calibrations of thirty-six (36) months.**
1 year	**Pressure Recorders in the Field** **Field recorders shall be calibrated every twelve (12) months with records kept as to found and left conditions.**

As needed	**Record-Keeping Procedures** The following records shall be maintained on all new underground piping system installations and repairs and/or changes to existing underground piping systems in detail to provide historical information, physical location, design ratings, and any other data necessary for the safe and continuous operation and maintenance by the Gas Operator. **Gas Distribution Main Lines** The Gas Operator shall review and update system maps on a regular basis. Completion reports for new installations, repairs or replacements shall be stored as a permanent record for the life of each gas main. All records shall be made available. **Patrols and Leak Surveys** The Gas Operator shall maintain records of transmission and distribution pipeline patrols and leakage surveys as specified in "Distribution Piping Maintenance". **Underground Valves** Distribution valves shall be plotted on gas system maps. Individual map reference records shall be maintained indicating size, type, and location of each valve. The inspection and maintenance record of each control valve and each inlet control valve at regulator stations will be maintained by the Gas Operator. The inspection and maintenance records of all other control valves will be maintained as well by the Gas Operator. Records shall be maintained for the life of the valve. Service valves shall be shown on individual service tickets with size, type, and location. **Services** Completion reports (service tickets) showing size, type, tap location, valve location, corrosion control facilities and pressure tests of each service shall be recorded as a permanent record and maintained in the Gas Operators Records. **Meters** The Gas Operator shall maintain records on each gas meter for the life of the meter. Records shall show: 1. Locations 2. Date of installation and removal 3. Ticket when installed and removed 4. Maintenance performed on the gas meter **Regulators and Relief Valves** The Gas Operator shall keep updated drawings of all gate stations, district regulators, and large industrial regulator installations. The Gas Operator shall maintain a data card showing make, type, serial number, inner valve size, set pressures, relief settings and a record of all inspections and maintenance.

	Odorization Records shall be kept of the average daily odorant usage, and of all odorometer or other tests used to determine effectiveness of odorization. **Records are to be kept on file for at least one (1) year.** **Leaks** The Gas Operator shall keep a record of all reported leaks and the disposition of each leak reported in accordance with the procedure set forth by the Department of Transportation. The Gas Operator shall maintain a record of all leaks found by a frequently scheduled leak survey. **Other** The Gas Operator and or contractors that are Operator Qualified task oriented for specific operations shall maintain records of their own area of responsibility that are necessary for the safe & efficient operation of gas system.

Gas Operator's Compliance Requirement

Customer Notification

Gas Operator does not maintain customer owned, buried service piping. Therefore, Gas Operator must notify affected customers once, in writing, of the following information:

(1) Gas Operator does not maintain the customer's piping.
(2) If the customer's buried piping is not maintained, it may be subjected to the potential hazards of corrosion and leakage.
(3) Buried gas piping should be:
(a) Periodically inspected for leaks
(b) Periodically inspected for corrosion if the piping is metallic; and
(c) Repaired if any unsafe condition is discovered.
(4) When excavating near buried gas piping, the piping should be located in advance, and excavation done by hand.
(5) Plumbers and heating contractors may locate, inspect, and repair the customer's buried piping.

Such notification shall be made no later than August 14, 1996 or ninety (90) days after the customer first receives gas at a location where such piping has been identified.

Gas Operator must make the following records available for inspection to the Public Service Commission, a copy of the notice currently in use; and evidence that notices have been sent to customers within the previous three (3) years.

Public Awareness Notification

Tompkinsville Gas shall send out a mass mail-out for public education and notification based on the following:

* Residence living along transmission ROW (Interval 2 years)
* Residence living along distribution ROW (Interval 1 year)
* Public Officials (Interval 1 year)
* Excavators/Contractors/Third parties (Interval 1 year)
* Stakeholders (Interval 1 year)

NOTE: See audience participation.

With each mail-out, Tompkinsville Gas shall enclose an evaluation card for the audience participant to evaluate the program, offer suggestions for greater effectiveness in the educational process. 100% participation shall be strived for. Returns shall throughly be reviewed and counted to access audience participation. Addresses on evaluation returns shall be strategically identified and mapped for future areas for pinpointing greater efforts in reaching the audience.

Excess Flow Valve

Excess Flow Valves shall be installed on new service line or replaced service line that operates continuously throughout the year at a pressure not less than 68.9m (10 psig) and that serves a single residence. On these lines an operator of a natural gas distribution system must notify the service line customer once in writing with a written notice

* An excess flow valve meeting the performance standards prescribed under 192.381 shall be installed by the operator as a mandatory requirement of the OPS/DOT at no cost to the customer;

EFV installation shall be provided:

* On new service lines when the customer applies for service.
* On replaced service lines when the operator determines the service line will be replaced.
* If a service line customer requests installation, the operator shall install the EFV at an agreeable date.

When notification is not required:
The notification requirements do not apply if the operator can demonstrate the following:

* That the operator will voluntarily install an excess flow valve or that the state or local jurisdiction requires installation;
* That excess flow valves meeting the performance standards of 192.381 are not available to the operator;
* That an operator has prior experience with contaminants in the gas stream that could interfere with the operation of an excess flow valve, cause loss of service to a residence, or interfere with necessary operation or maintenance activities, such as blowing liquids from the line.
* That an emergency or short time notice replacement situation made it impractical for the operator to notify a service line customer before replacing a service line. Examples of these situations would be where an operator has to replace a service line quickly because of:
* Third party excavation damage;
* Grade 1 leaks
* A short notice service line relocation request

Employee Training/Operator Qualification/Emergency Procedures Training

All employees shall be trained and qualified to performed assigned duties as well as respond to abnormal operating conditions that may develop on the operator's pipeline facility. All gas operators and master meter operators must have an Operator Qualification training and evaluating program on or after April 27, 2001. The Operator Qualification Program must match the gas operator's Operating and Maintenance Procedures/Emergency Procedures for that system and shall not deviate from the systems design criteria.

An employee meeting shall be scheduled at least once each calendar year for the purpose of discussing and training of employees in emergency procedures.

The employee training and discussions shall include the following: Also see Review of Abnormal Operating Conditions.

1. Review of emergency procedures.

2. Review of location and use of emergency equipment.
3. Review of location and use of system maps, service and valve records, etc.
4. Review of actions, step by step, to be taken in a hypothetical emergency situation.

NOTE: Records of attendance at each meeting shall be kept on file.

Public Education/Communications

There shall be a continuing education program to enable customers, the public, appropriate government agencies, and persons engaged in excavation activities to recognize a gas emergency for the purpose of reporting it to Gas Operator. CFR 49, 192.616

The following is a minimal list of information to be supplied

1. Information about gas.
2. Recognition of gas odor (Odorant.)
3. What to do and what not to do when a strong gas odor is detected.
4. Necessity of notifying the Gas Operator prior to excavating or performing excavation related activities.
5. Telephone number to call for information or to report an emergency.

Information may be conveyed to the public by radio, television, newspaper, meetings, public talks, bill stuffers, mailings, and/or handouts.

A record of the public education program and related activities shall be maintained by the Manager of the Gas System/Gas Operator.

Damage Prevention

The Gas Operator shall maintain a continuously updated, list of all persons requesting underground utility location in its service area.

The Gas Operator shall raise public awareness of the one call system through newspaper, radio and television advertisements, postings at public/government buildings and or bill stuffers.

Underground construction contractors will be routinely reminded of the one call system at pre-construction meetings and in their dealings with The Gas Operator distribution personnel.

All requests for facility locations, including those generated within The Gas Operator shall be directed to the One Call System to ensure consistency in service and record keeping. Parties requesting locations may contact the Gas Operator to check the status of their request.

One Call System tells the locate requestor which utility companies will be notified and suggests that if there are any other known utilities in the area, those companies should be contacted directly. One Call System further informs the caller of the date the locate is to be completed and assigns the requesting caller a number which can be used to verify the request and check the status of location work.

Gas piping locations are to be indicated by yellow paint and or wooden stakes and approved flags marked "Gas". Any offset used in marking to preserve the markings shall be duly noted on the ground or stake. Water and underground electric lines are to be similarly marked using blue and red.

If there is reason to believe proposed underground construction will damage the pipeline, the locator is to notify the operator or appropriate gas personnel in which the work is proposed. A gas distribution representative will contact and coordinate with the excavator to ensure the integrity of the pipeline through adequate inspection of work.

A team of utility companies, excavators, locators, contractors, etc. have for the purpose of damage prevention and improving communications between all members of the excavating community. This is done to provide a forum of concerned professionals to have a joint effort in developing a plan to protect life and property for the people of .

Liaison with Public Officials

Liaison shall be maintained with the appropriate fire and police organizations and the Emergency Management Agency with respect to gas emergency procedures. The purpose of such liaison shall be to acquaint the appropriate governmental agencies with the operator's ability to respond to a gas system emergency and to discuss the responsibilities of each agency that may respond to a gas emergency.

Gas emergency training sessions, emphasizing proper procedures to follow in a gas emergency, may be scheduled with fire and police organizations or performed in Safety Meeting sessions as required.

Liaison with the Emergency Management Agency will be coordinated by the Gas Operator as part of the **"The Emergency Response Plan."**

Liaison with local fire and police agencies will be coordinated by the Gas Operator.

Records of meetings or training sessions held with governmental agencies for the purpose of gas emergency response shall be kept on file addressing safety related training.

System Maps

The Gas Operator shall assess all segments of the gas distribution system and shall maintain up-to-date records and maps of the system and shall review them on a regular basis. Completion reports for new installations, repairs or replacements, class location, design, construction tests, condition and history of the piping and shall comply with all applicable codes. Reports and history shall be stored as a permanent record for the life of each gas main. All records shall be made available and shall include the following information:

System Pressures	**Cathodic Check Pts**	**Tap Locations**	**Piping Locations**	**Regulator Sta. Loc**	**Utilities Crossings**
Pressure Check Pts	**Casings/Crossings**	**Valve Locations**	**Meter Locations**	**Telemetering Sta. Loc**	**Right-of-Ways**

PROGRAM DEFINITIONS AS APPLIED TO SUB-PART P (192.1001 through 192.1015)

Excavation Damage means any impact that results in the need to repair or replace an underground facility due to a weakening, or the partial or complete destruction, of the facility, including, but not limited to, the protective coating, lateral support, cathodic protection or the housing for the line device or facility.

Hazardous Leak means a leak that represents an existing or probable hazard to persons or property and requires immediate repair or continuous action until the conditions are no longer hazardous.

High Consequence Area A high consequence area means any of the following areas:
(a) An area defined as a Class 3 location under §192.5;
(b) An area defined as a Class 4 location under §192.5;
(c) For a pipeline not more than 12 inches in nominal diameter and operating at a maximum allowable operating pressure of not more than 1200 psig, an area which extends 300 feet from the centerline of the pipeline to the identified site;
(d) For a pipeline greater than 30 inches in nominal diameter and operating at a maximum allowable operating pressure greater than 1000 psig, an area which extends 1000 feet from the centerline of the pipeline to the identified

site; and
(e) For a pipeline not described in paragraph (c) or (d) of this section, an area which extends 660 feet from the centerline of the pipeline to the identified site.
(f) An identified site. An identified site is a building or outside area that;
(1) Is visibly marked;
(2) Is licensed or registered by a Federal, State, or local agency;
(3) Is known by public officials; or
(4) Is on a list or map maintained by or available from a Federal, State, or local agency or a publicly or commercially available database; and
(5) Is occupied by persons who are confined, are of impaired mobility, or would be difficult to evacuate. Examples include, but are not limited to hospitals, prisons, schools, day-care facilities, retirement facilities, and assisted-living facilities; or
(6) There is evidence of use of the site by at least 20 or more persons on at least 50 days in any 12-month period. (The days need not be consecutive.) Examples include, but are not limited to, beaches, playgrounds, recreational facilities, camping grounds, outdoor theaters, stadiums, religious facilities, and recreational areas near bodies of water.

Integrity Management Plan or IM Plan means a written explanation of the mechanisms or procedures the operator will use to implement its integrity management program and to ensure compliance with this subpart.

Integrity Management Program or IM Program means an overall approach by an operator to ensure the integrity of its gas distribution system.

Mechanical fitting means a mechanical device used to connect sections of pipe. The term "Mechanical fitting" applies only to:

(1) Stab Type fittings;

(2) Nut Follower Type fittings;

(3) Bolted Type fittings; or

(4) Other Compression Type fittings.

Small LPG Operator means an operator of a liquefied petroleum gas (LPG) distribution pipeline that serves fewer than 100 customers from a single source.

082050.01 THREAT ASSESSMENT

Acceptable assessment methods

✪Internal inspection, pressure testing, and direct assessment are acceptable methods to assess the pipeline integrity. The method(s) selected must be appropriate to address the identified threats to the line being assessed. Direct assessment can only be used where the threats are external or internal corrosion or stress corrosion cracking).
✪Confirmatory direct assessment can be used for assessments as long as the prescribed interval, seven-year before the re-assessments are scheduled to occur. Technologies that can demonstrate an equivalent understanding of pipe condition may be an acceptable method.

As described in 49 CFR, 192.1007, Sub-part P, knowledge must be demonstrate as an understanding of it's gas distribution system. All available information must be ascertained and developed as elimination of threats to the system.

✪Understanding and knowledge of the characteristics of the pipeline's past and future design, operations and environmental conditions are necessary to anticipate and eliminate threats and risks to the gas distribution pipeline.

✪Through sheer attrition information can be gained so as to develop and provide a plan for gaining and conducting activities on the pipeline (design, construction, operations or maintenance activities).

✪Develop and implement a process by which the DIMP program can be reviewed periodically and reviewed for future modifications success.

✪Provide for the capture and retention of data on any new pipeline installed. The data must include, at a minimum, the location where the new pipeline is installed and the material of which it is constructed. **See: Main/Service Request Form #22.**

✪**Identify threats.** The operator must consider the following categories of threats to each gas distribution pipeline: corrosion, natural forces, excavation damage, other outside force damage, material or welds, equipment failure, incorrect operations, and other concerns that could threaten the integrity of its pipeline. An operator must consider reasonably available information to identify existing and potential threats. Sources of data may include, but are not limited to, incident and leak history, corrosion control records, continuing surveillance records, patrolling records, maintenance history, and excavation damage experience.

Identify Threats (Threat Category)(Fishbone Analysis)(Question IT, Answer IT)
1. Determine whether a threat exist
2. Determine the extent of the risk

Primary Threats
1. Regulator Station Failure
    * Regulator (single/monitor type)
    * Relief Valves
    * Low Pressure Systems
    * Gate Station(s)
        a. Monitors(s)
        b. Relief(s)
        c. Valves(s)
            (i) Plug Valves
            (ii) Gate/Spur
            (iii) FE Plug Valve
            (iiii) Winged (Lubricated/Dry)
2. Critical Valves (Plug Valves)
    * Operation (non-operational)
    * Repair
3. Gas Leaks
    * Underground (migration)
    * Above Ground
    * Gas lines damaged by outside forces (striking underground lines)
4. Corrosion
    * Underground pipe
        a. Check anodes/anode beds/corrosion cells/rectifier)
    * Atmospheric Corrosion
        a. Carbonic
        b. Sulfuric
        c. Bacteria
        d. Detergent/bacteria exposure
    * External Corrosion
        a. Bare steel
        b. Cast Iron (class)(6 inch and smaller in diameter) and (larger than 6 inch in diameter)
            1. Six-inch and smaller group
                1a. Corrosion (graphitization)
                1b. Excavation damage
                1c. Natural forces (frost/heaving/loading)
                1d. Materials welds and joint failures
                1e. Construction defects (support during construction and backfilling)

2. Larger than six-inch group
    2a. Corrosion (graphitization)
    2b. Excavation damage
    2c. Natural forces (frost/heaving/loading)
    2d. Materials welds and joint failures
    2e. Construction defects (support during construction and backfilling)

THREAT	**CONSEQUENCE FACTOR**
6" and Smaller Group	
Corrosion (graphitization)	**2**
Excavation damage	**8**
Natural forces (frost/heaving/loading)	**7**
Materials welds and joint failures	**6**
Construction defects (support during construction and backfilling)	**3**

THREAT	**CONSEQUENCE FACTOR**
6" and Smaller Group	
Corrosion (graphitization)	**1**
Excavation damage	**5**
Natural forces (frost/heaving/loading)	**3**
Materials welds and joint failures	**3**
Construction defects (support during construction and backfilling)	**3**

c. Steel
* Coated/Wrapped
    a. Quash/Voids (wrapping)

5. Equipment Failure
* Metering Stations
    a. Meters
        I. Diaphragm Meter
        II. Rotary
        III. Turbine
    b. Telemetering/Recording Measurement
        I. Correctors
        II. Recorders
        III. Automated Meter Reading (AMR)
        IV. Solar-Flow Computer(s)
    c. Scrubber(s)/Strainer(s)/Filter(s)

6. Material Failure
* Pipe (cast/steel/PE Plastic)
* Welds
* Weld Components

* Coupling(s)
* Compression Fittings
* Valves
* Flanges
* Meters
* Regulators (Direct Operated)
* Valve Covers (boxes/vaults/pits)
* Clamps (temporary)

7. Excavation Damage
    * Operator error
    * Third Party
8. Natural Forces
    * Earthquake
    * Seismic Event
    * Settlement
    * Improper Backfill
    * Heaving and Loading
    * Washout
    * Flooding
    * Tornado
    * Hurricane
    * Thunderstorm
    * Lightning Storm(s)
    * Acid Rain/Pollutants
    * Sink Holes (area)
9. Incorrect Operation
    * Operator Error (not following procedures)(procedures not being executed properly)
    * Changes to tools methods and safety precautions
    * Manufacturing Defect
    * Calibration adjustment(s)
    * Improper adjustment(s)
    * Improper use of mutual assistance personnel
    * Seasonal Raises/Lowers (exceeding the MAOP)
        a. Regulator Stations (exceeding the MAOP)
            I. Gate Station
            II. District Station
10. Consequences Factors
    * Location of facilities in relationship to people and property
    * Potential of gas releases in highly populated areas

DESCRIPTION	CONSEQUENCE FACTOR
Population/Location	
Rural class 1 and class 2 locations	**3**
Suburban class 3 locations	**6**
Urban class 4 location	**8**
Sensitive facilities in class 3 and 4 location	**10**
Isolated sensitive facility	**7**
Concentrated population in the business district	**7**
Facilities near buildings meter sets and service lines	**6**
Facilities away from buildings street mains	**4**

DESCRIPTION	CONSEQUENCE FACTOR
Operating Pressures	
Low Pressure (11" of Water Column)	**2**
1 to 25 psig	**4**
25 to 60 psig	**6**
Greater than 60 psig	**8**
Nominal Sizes @ Risk	
6" and smaller	**4**
Larger than 6"	**7**

CONSEQUENCE FACTOR DETERMINATION	
6" and Smaller Group (Operating @ low pressure)	
Large Diameter	**4**
Low Pressure	**2**
Suburban area	**6**
TOTAL CONSEQUENCE FACTOR	12

CONSEQUENCE FACTOR DETERMINATION			
Larger than 6" Group (Operating @ 20 psig)			
Large Diameter			7
1 to 24 psig			**4**
Suburban area			**6**
TOTAL CONSEQUENCE FACTOR			17
Threat (6" and Smaller)	**Likelihood**	**Consequence**	**Risk**
Corrosion	**2**	12	**24**
Excavation damage	**8**	12	**96**
Natural forces	**7**	12	**84**
Outside forces	**0**	12	**0**
Joints bell and spigot	**6**	12	**72**
Joints mechanical	**4**	12	**48**
Equipment failure	**0**	12	**0**
Operator error	**3**	12	**36**

Threat (Larger than 6")	Likelihood	Consequence	Risk
Corrosion	**1**	17	**17**
Excavation damage	**5**	17	**85**
Natural forces	**0**	17	**0**
Outside forces	**0**	17	**0**
Joints bell and spigot (Cast Systems only)	**3**	17	**51**
Equipment failure	**0**	17	**0**
Operator error	**1**	17	**17**

See: Target Graphic Charts prioritization (committee driven.)

11. Other Outside Forces (only aboveground facilities)
    * Vehicle Traffic (auto/trucks/forklifts/heavy equipment)
    * Vandalism
    * Sabotage
    * Wind/storms/flooding
    * Unauthorized (adjustment(s))
12. Other Outside Forces (only below ground facilities)
    * Underground Material

a. Pipe (other)
b. Metal(s)
(i)Ferrous
(ii) Non-Ferrous
c. Tree Roots
d. URD (Underground Electric)
e. Railroad Wiring (contact to pipe)(Frog/Switch Gear)
f. Blasting
g. Heaving/Loading
h. Encroachment

082050.02 RISK ASSESSMENT

Risk Evaluation
1. Risk that can possess potential problems
2. Frequency is used as an indicator of the likelihood of a continued problem
3. Common consequences
    * Gas migration
    * Cover type
    * Service link and infiltration
    * Building use or type
    * Population density
    * Other sources of leakage migration (sewers and storm drains)
    * Pipe depth
    * Third-party construction activities
4. Purpose of evaluations (subject matter expert and mathematical calculations)
5. Use of subject matter experts and personnel's knowledge of system

Risk Ranking Validation
1. Review the results and the system's historical records to ensure the focus is on the same facilities
2. Do the results agree with the personnel (SME) experience
3. Revised evaluation process if needed
4. Gather more information
5. Reevaluate the (SME) experience

Implement Risk Management Actions
1. Eliminate or reduce likelihood of problems occurring
2. Eliminate the consequences of potential problems
3. Reference the GPTC Guide Material
4. Installation of EFV's address the risk management threat or excavation damage

Accelerated Actions
1. Continuation and complete replacement activities involving cast-iron
2. Ensure accurate and timely locates
3. Rechecks on any projects involving cast-iron replacement program
4. Damage prevention compliance
5. Ensure locator OQ task evaluation annually (Field Evaluation)(OQ Records)
6. Ensure compliance of the 811 call group
7. Leak surveys and management
    * Locate the leak on the system
    * Evaluate the potential hazards of the leak
    * Action to eliminate the leak

* Keep accurate records
* Evaluate repair procedures

8. Operator qualification compliance
9. Public awareness plan compliance
10. Drug and alcohol testing compliance

Measure Performance Results

1. Hazardous leaks eliminated by repair/installed
2. Number of excavation damages
    * Operator error
    * Third party
3. Number of DIG tickets
4. Total leaks eliminated repair/Installed
5. Hazardous leaks eliminated by replacement materials (documentation record of materials)
6. Compliance of grade 1, grade 2, and grade 3 leaks repaired
7. Cast-iron replacement program
8. Updating locating program
9. Annual calculations of cost to operator including pipe repair or placement

Periodic Evaluation and Improvement Review

1. Evaluate threats and risks in zones to identify problem areas
2. Review the written DIMP program to ensure accuracy and appropriate measures
3. Analyze the effectiveness of the program
4. Review of DIMP measures and compliances shall be reviewed on a five-year basis
5. Identify all program improvements and modifications

Reports/Recordkeeping

1. Provide reports for performance measures to state authorities annually
2. Report compliances shall address delivered mail, fax and e-mail (electronic reporting)

082050.03 RISK EVALUATION AND PRIORITIZATION

✪**Evaluate and rank risk**. Tompkinsville Gas shall evaluate the risks associated with its distribution pipeline. Tompkinsville Gas shall determine each threat and estimate and rank the risks posed to its pipeline. ✪The evaluation must address current and potential threat(s). The possibility of a failure in conjunction with each threat, and the potential results from these possible failures, allows the operator the choice to subdivide its pipeline into sections or regions as long as these sections/regions have a similar piping system as referenced to distribution pipelines, mains, services and overall same design characteristics; similar actions would be effective in reducing the risk per section. ✪Each pipeline segment covered, must be considered for scheduling based on the baseline assessments and periodic re-assessments. Risks must be evaluated using a risk assessment for prioritizing pipe segments for assessment.

NOTE: Evaluations shall be based on the Leak Management Program as it applies to Class Locations, grading the leaks as they apply to piping materials in the piping system. Tompkinsville Gas shall base the Leak Management Program on it's current state authority mandated repair policies. **See: Leak Table 1.**

LEAK TABLE 1		
GRADE 1	**GRADE 2**	**GRADE 3**
Repaired Immediately	Repair within 6 months	Re-evaluate in 12 months

Leak Classification

Grade "1" - This classification shall designate a leakage condition which, due to its location and/or relative hazard potential, shall require immediate corrective action until the hazardous condition no longer exists.

The leak shall then be scheduled for immediate repair activity. Grade "1" leaks include, but are not limited to:

1. Any indication of gas entering buildings or tunnels.
2. Any reading from a combustible gas indicator within five (5) feet of the foundation wall of a building which, in the judgment of the representative of the Gas Operator, is potentially dangerous.
3. Any reading of at least 4% gas-in-air or greater from a combustible gas indicator on a sidewalk in a paved area.
4. Blowing gas.
5. A leak from a transmission line within Class 3 and 4 locations as specified in 49 CFR 192.5, "Class Locations".
6. Any gas in air reading, in a manhole, vault, or catch basin.
7. Any leak which, in the judgment of the representative, is regarded as potentially hazardous.

Grade "2" - This classification shall designate a leakage condition which, due to its location and/or relative hazard potential, does not require immediate attention, but which shall be scheduled for repair within six (6) months or shall be rechecked during the next annual survey. Rechecked Grade "2" leaks which have not deteriorated may be rescheduled for repair if they are not in a hazardous location and the repair would be difficult or expensive. Grade "2" leaks include, but are not limited to:

(1) Transmission line leaks not classified as Grade "1".
(2) A leak on a valve or component which has migrated beyond the valve box which in the judgment of the representative requires scheduled repair.
(3) Reading from a combustible gas indicator between 2% and 4% gas-in-air confined to a sidewalk in a paved area.
(4) Any Grade "3" leak which under frost conditions could migrate.
(5) A high density of Grade "3" leaks in the street of a business or residential area.

Grade "3" - This classification shall designate a trace which due to its location and/or relative hazard potential does not require scheduled repair, but should be checked at least once a year to determine the current condition of the leakage.

Downtown District

A combustible gas indicator or Flame Ionization Unit survey using either mobile or walking of all gas, electric, water, telephone, and sewer manholes in the downtown district shall be conducted at least once each year. This survey will check all openings and cracks encountered in the streets. A map depicting the boundaries of the downtown district shall be accessible with the Gas Operator and shall be updated.

GRADE 1: All leaks determined to fall within the Grade "1" category shall be reported by the surveyor immediately to the responsible personnel. The responsible personnel shall dispatch a repair crew at once to the location of the leak. The crew shall repair the leak or, after investigation by barhole survey or other appropriate means, reclassify the leak and notify the responsible personnel who will schedule the repair at a later date.

GRADE 2: If the surveyor discovers an explosive mixture in any manhole, he/she shall report this condition to the responsible personnel, who will notify the appropriate owner of the manhole by telephone, and later by letter, of the dangerous condition. The condition reported in the letter will be in effect until the repair crews have eliminated the hazard. The appropriate party shall be notified by letter after the leakage has been stopped. All leaks judged to be in the **Grade "2"** category shall be reported by the leak surveyor at the end of the workday. These leaks will be given to the appropriate responsible personnel who shall schedule repair work within a reasonable length of time. This time shall be governed by the leak location (Class Location).

Grade 3: The **Grade "3"** leaks shall be reported and scheduled similar to Grade 2 leaks, but should be scheduled after Grade 1 and 2 leaks have been repaired.

Business Districts Other Than the Downtown District

(A) Areas where the majority of buildings on either side of the street are utilized for business use, such as, retail, wholesale, office, or service.

(B) Areas where the majority of buildings on either side of the street are high occupancy multistory buildings or buildings with multiple businesses that share common walls.

(C) Areas where gas facilities are under continuous paving that extends from the center line of the street to the building wall.

There shall be a Flame Ionization Unit/Combustible Gas Indicator survey of all manholes and street openings in these sections at least once each year. The surveyor shall be familiar with areas where the gas mains are located in easements and shall survey the easements, particularly those in suburban shopping centers.

Alternatively, the survey may be conducted with flame ionization equipment using either a FI back pack unit or, where the mains are accessible, a mobile unit.

The leaks detected shall be reported and repaired in accordance with the provision outlined in **Leak Table 2,** "Downtown District".

Residential and Rural Districts (Outside Business Districts)

Geographical areas for the purpose of surveying one area a year on a rotating basis may be changed from year to year because of growth or due to unaccounted for gas either high or unusual, but the area shall not be changed in which this action would prevent one-fifth of the gas distribution system from being surveyed each year so as to survey the entire gas system in five (5) years.

Additional surveys may be conducted at the discretion of the Gas Operator. The leaks detected shall be reported and repaired in accordance with the provisions outlined in Section "Downtown District".

Buildings of Public Assembly

Buildings of public assembly that are within a hundred (100) feet of a gas main or service (regardless of whether the building has a gas service) shall be surveyed annually with either a combustible gas indicator, using the bar hole method, or a flame ionization back pack unit. A building of public assembly is defined as one that regularly accommodates more than a hundred (100) people for economic, educational, health, religious, recreational, entertainment, or dining purposes. Buildings of public assembly include, but are not limited to, the following:

(A) Schools, colleges, and universities
(B) Hospitals
(C) Nursing and convalescent homes
(D) Churches
(E) Child care facilities
(F) Restaurants
(G) Theaters
(H) Night clubs
(I) Enclosed sports/entertainment arenas
(J) Museums
(K) Fairgrounds, amusement parks, and tourist attractions
(L) Convention centers
(M) Governmental assembly buildings
(N) Hotels and motels (with meeting room facilities)
(O) Malls and shopping centers
(P) Department stores
(Q) Supermarkets

NOTE: The gas distribution system shall be monitored based on 5 surveys in a 5 year interval. The yearly surveys shall be based on performing surveys on 1/5 th of each of the 5 sections per year, so 1/5 th of each section (5) is surveyed each year.

✪Identify and implement measures to address risks. Determine and implement measures designed to reduce the risks from failure of the gas distribution pipeline.

✪Measure performance, monitor results, and evaluate effectiveness. Use the forms section **052874-1-29.**

❶ Develop and monitor performance measures from an established baseline to evaluate the effectiveness of the DIMP program. An operator must consider the results of its performance monitoring in periodically re-evaluating the threats and risks. These performance measures must include the following:

(i) Number of hazardous leaks either eliminated or repaired as required by 192.703(c), or total number of leaks if all leaks are repaired when found, categorized by cause;

(ii) Number of excavation damages;

(iii) Number of excavation ticket records of the information by the underground facility operator from the notification center/811;

(iv) Total number of leaks either eliminated or repaired, categorized by cause;

(v) Any additional measures the operator determines are needed to evaluate the effectiveness of the operator's DIMP program in controlling each identified threat. **See: Leak Survey Form 052874-9.**

❷ Periodic Evaluation and Improvement. An operator must re-evaluate threats and risks on its entire pipeline and consider the relevance of threats in one location to other areas. Each operator must determine the appropriate period for conducting complete program evaluations based on the complexity of its system and changes in factors affecting the risk of failure. An operator must conduct a complete program re-evaluation at least every five years. The operator must consider the results of the performance monitoring in these evaluations.

❸ Report results. Report, on an annual basis, the four measures listed in paragraphs (1)(i) through (1)(iv) of this section, as part of the annual report required by 191.11. An operator also must report the four measures to the state authority if a state exercises jurisdiction over the operator's pipeline.

Key Notes:

191.11 Distribution System: Annual report.
(a) General. Except as provided in paragraph (b) of this section, each operator of a distribution pipeline system must submit an annual report for that system on **DOT Form PHMSA F 7100.1–1**. This report must be submitted each year, **not later than March 15, for the preceding calendar year.**

(b) **Not required**. The annual report requirement in this section **does not apply to a master meter system** or to a **petroleum gas system that serves fewer than 100 customers from a single source.**

191.12 Distribution Systems: Mechanical Fitting Failure Reports

Each mechanical fitting failure, as required by 192.1009, must be submitted on a Mechanical Fitting Failure Report **Form PHMSA F–7100.1–2**. An operator must submit a mechanical fitting failure report for **each mechanical fitting failure that occurs within a calendar year not later than March 15 of the following year** (for example, all mechanical failure reports for calendar year 2011 must be submitted no later than March 15, 2012). Alternatively, an operator may elect to submit its reports throughout the year. In addition, an operator must also report this information to the Kentucky Public Service Commission, pipeline safety authority.

Tompkinsville Gas shall consider prioritizing it's pipe segment(s) for assessment and re-assessment based on recordkeeping.

The risk posed by each pipeline segment covered shall be considered in scheduling baseline assessments and periodic re-assessments. Risks shall be evaluated using a risk assessment that meets ASME/ANSI B31.8S, Section 5, as required by 192.917(c). Section 5.10 of the standard specifically addresses use of risk assessment for prioritizing pipe segments for assessment.

Tompkinsville Gas shall identify and evaluate all potential threats to each covered pipeline segment. Potential threats that must be consider, but are not limited to, the threats listed in ASME/ANSI B31.8S (also see: 49 CFR 192.7), section 2, which are grouped together under the following four categories:

(1) Time related threats such as internal corrosion, external corrosion, and stress corrosion cracking;

(2) Static or residential threats, such as fabrication or construction defects;

(3) Time related threats such as third party damage and outside force damage; and

(4) Human error.

082050.04 NATURAL GAS SYSTEM

Tompkinsville Gas shall depend exclusively on the Tompkinsville Gas, Gas Distribution Pipeline History Records/Recordkeeping. See: **Recordkeeping Folder.**

082050.05 ADDITIONAL/ACCELERATED MEASURES TO ADDRESS RISKS

The operator must demonstrate knowledge of its pipeline, which, to the extent known, should include the approximate location and material of its pipeline. The operator must identify additional information needed and provide a plan for gaining knowledge over time through normal activities conducted on the pipeline (example: design, construction, operations, maintenance and damage activities.)

KEY NOTE: The extended periods between and during activities may result in information gathered and evaluated in order to provide witness and review:
❶ Design flaws
❷ Material defect issues
❸ Contractor digging education (811)

a. Public Awareness Plan (notifications/handouts/newspaper/radio/TV/postings)(meeting(s))
b. Public Liaisons Meetings (first responders)
I. Operator Qualified Gas Personnel
II. Fire Department
III. Police Department
IV. Emergency Management Agency (EMA)
V. State Homeland Security (representatives)

❹ Operator error (incorrect operations)
I. Seasonal Raises/Lowers (Regulator Stations)
II. Regulator(s)/Relief(s)
(i) Improper regulator settings
(ii) Improper Relief Valve settings
II. Odororizer
(i) Setting rates (liability)
(ii) Adjusting stroke(s)
(iii) Filling Tanks (liability)
(iiii) Transportation of product (liability)
III. Meter(s)
(i) Residential
(ii) Commercial
(iii) Industrial
1. Diaphragm
2. Rotary
3. Turbine
4. Orifice Meter

082050.06 MANDATORY ADDITIONAL ACTIONS

Where sections of consensus standards are incorporated by reference into a rule, those sections become binding requirements, the same as if the language were repeated in the rule. Operators must follow the requirements in the Appendices of ASME/ANSI B31.8S when those Appendices, or sections thereof, are referenced in the rule, even though the standard indicates that the appendices are non-mandatory.

082050.07 RISK BASED ADDITIONAL ACTIONS

The integrity management primary function is to reduce the risk of pipeline failures to high consequence areas. The integrity management programs developed to comply with rule requirements must include the use of risk analysis to support operator integrity decisions. Operator risk analysis processes require the evaluation and measurement of both the probability and consequences of pipeline failures. The appropriate consequences to be included in these risk analyses depend on the decisions by the risk analysis.

In the context of fulfilling requirements of the integrity management rule, operators should maintain a focus on the risk of failures to high consequence areas. These failures may result in (plant shutdown(s)/curtailment(s).

If consequences considered in the risk analysis are expanded to include consequences related to operator business performance, then the operator must provide assurance that this approach does not skew decisions away from protection of HCAs. For example, consideration of operator business performance consequences should not result in pipeline segments with high risk to HCAs being given lower priority for integrity assessments than segments with low risks to HCAs but higher business consequences. There may be situations in which business impacts have secondary related safety consequences. Operators may include these consequences in the overall assessment of risk related to an integrity decision. It is necessary, however, the secondary consequences are evaluated and balanced appropriately with other safety consequences in the risk analysis.

Tompkinsville Gas shall create a Risk Analysis Committee (team members to review options that affect or may affect the performance of the gas pipeline facility.)

082050.08 RISK BASED PERFORMANCE MEASURES

Risk analysis/performance based elements required by the rule depend on the results of data integration and risk analysis. The baseline assessment plan must include a schedule based, in part, on risk factors. The operator's initial risk analysis should be performed early in the DIMP program implementation, before the baseline assessment plan is finalized.

Operators are expected to make a good faith effort to establish contact with public safety officials along portions of its pipeline containing HCAs. The failure of public safety officials to respond along some portions of a pipeline right-of-way should not be a basis for assuming that officials in other locations will not cooperate. If contact cannot be established, the rule requires the use of other sources of information for identification of identified sites.

Contact Officials

*State Road Departments
*Public Works Depart
*Sewer Department
*Electric Departments (URD)
*Cable or Telephone Companies

✪The Public Awareness Plan should be used to contact and develop a Mutual Assistance Agreement with public and private officials. Stakeholder meetings.

✪Public Liaison Meeting/Public Education as addressed in the CFR 192.615©, mandates compliance on an annual bases.

082050.09 MONITOR RESULTS AND EVALUATE EFFECTIVENESS

(e) Measure performance, monitor results, and evaluate effectiveness. **192.1007(e)(1)(i)(ii)(iii)(iv)(v)(vi)**

(1) Develop and monitor performance measures from an established baseline to evaluate the effectiveness of its IM program. An operator must consider the results of its performance monitoring in periodically re-evaluating the threats and risks. These performance measures must include the following:

(i) Number of hazardous leaks either eliminated or repaired as required by 192.703(c) of this sub-chapter (or total number of leaks if all leaks are repaired when found), categorized by cause;

(ii) Number of excavation damages;

(iii) Number of excavation tickets (receipt of information by the underground facility operator from the notification center);

(iv) Total number of leaks either eliminated or repaired, categorized by cause;

(v) Number of hazardous leaks either eliminated or repaired as required by 192.703(c) (or total number of leaks if all leaks are repaired when found), categorized by material; and

(vi) Any additional measures the operator determines are needed to evaluate the effectiveness of the operator's IM program in controlling each identified threat.

The compliance of this rule has been created and shall develop the evaluation program based on monitoring results of activity addressed in the 49 CFR 192.1007(i)(ii)(iii)(iv)(v)(vi). The Risk Analysis Committee shall be responsible for development a business plan for the accomplishment of the Tompkinsville Gas DIMP Program.

See Forms 052874 (1-30)

082050.10 PERIODIC EVALUATION AND IMPROVEMENT

Tompkinsville Gas shall re-evaluate threats and risks on the entire pipeline at least every five years. Tompkinsville Gas shall consider all the results of the performance monitoring and consider possible changes.

082050.11 REPORTING

F-7100 Forms

Interval	Compliance Description
1 year	Operators must continually monitor conditions along their pipeline. When they become aware of population or usage changes that create or change an HCA this information should be factored into the integrity assessment planning, risk analysis, and consideration of the need for additional preventive and mitigative risk controls.
10 years	Pipeline segments in newly-identified HCAs must be included in the Baseline Assessment Plan within one year after their identification. These pipeline segments must be assessed within ten years of their identification.

7 years	Assessments for all threats must be performed using in-line inspection, pressure testing, direct assessment, or "other technology" within the maximum intervals specified in 192.939, which vary based on operating stress levels. (Operators whose integrity management programs satisfy the criteria for "exceptional performance" in 192.913 can establish longer intervals for these assessments, based on their risk assessments). Seven-year assessments conducted within those maximum intervals (if the maximum interval exceeds 7 years) can be performed using confirmatory direct assessment or, for low-pressure pipelines.
7 years	Confirmatory direct assessment can be used for assessments conducted on no longer than seven-year intervals when re-assessments conducted using these specified methods are scheduled to occur at intervals longer than 7 years, and when the threats of concern are corrosion.
1 year 10 years	The rule specifies a ten (10) year assessment schedule for newly identified segments. Operators must list the newly identified segments in its baseline assessment plan, and document its assessment method selection and threat identification, within one year of identification. However, the assessment may be scheduled for completion at any time within that 10 year period following identification of the new HCA, without the need to re-prioritize the pre-existing assessment schedules.
7 years	7 year assessments may be fulfilled by confirmatory direct assessment, alone.
5 years	An operator must conduct a complete program re-evaluation at least every five years.
10 years	An operator must maintain records demonstrating compliance with the requirements of subpart P, for at least 10 years.
10 years	(c) Records. The operator must maintain, for a period of at least 10 years, the following records: (1) A written IM plan in accordance with this section, including superseded IM plans; (2) Documents supporting threat identification; and (3) Documents showing the location and material of all piping and appurtenances that are installed after the effective date of the operator's IM program and, to the extent known, the location and material of all pipe and appurtenances that were existing on the effective date of the operator's program.

082050.12 RECORD KEEPING

An operator must maintain records demonstrating compliance with the requirements of subpart P, for at least 10 years. The records must include copies of superseded integrity management plans developed under this subpart P.
Records shall be kept in:

*Assessment Reports
*Separate evaluations
*Forms (for each covered segment) **052874 (1-30)**
*DOT Report Forms (F7100.1.1-2)

Incidents/Accidents

a. Judgements
b. Fines/Fees
c. Penalties
d. Indictments
e. Settlements
f. Investigations

Leak History

a. Pipe Repair History
b. Fitting Repair/Replacement History
c. Welds
d. Installation(s) Mains/Services
e. Abandonment/Deactivation

Maintenance History

a. Trends
b. Projections

Continuing Surveillance Records

a. Leak Survey Records/Patrolling Records

Patrolling Records

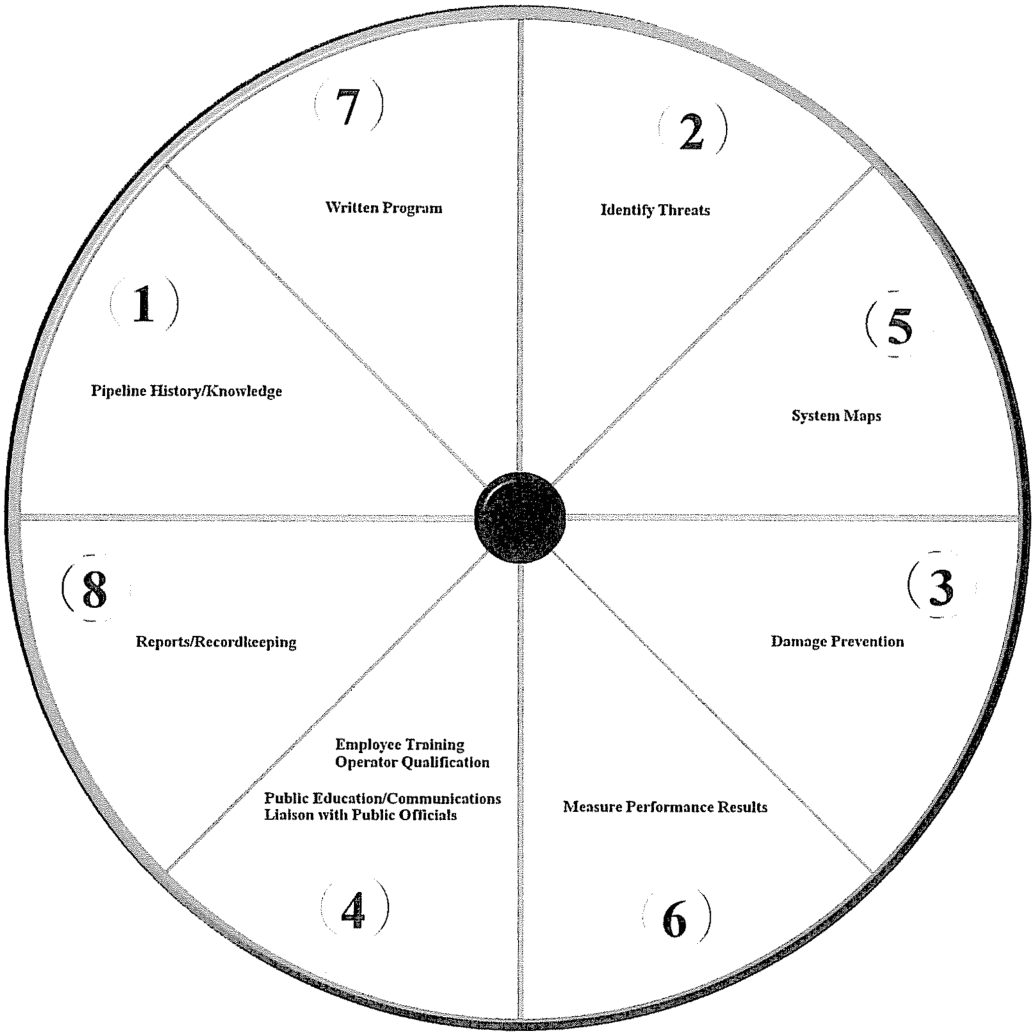
a. Special Surveys/Patrolling (blasting/up-rating/

Excavation Damages

a. Third Party
b. Customer(s)
c. Road Crews
d. Contractor(s)/Sub-Contractor(s)

Testing/Accuracy Equipment

a. Calibration/Testing



Sunburst/Fishbone Analysis 082050

1	
2	
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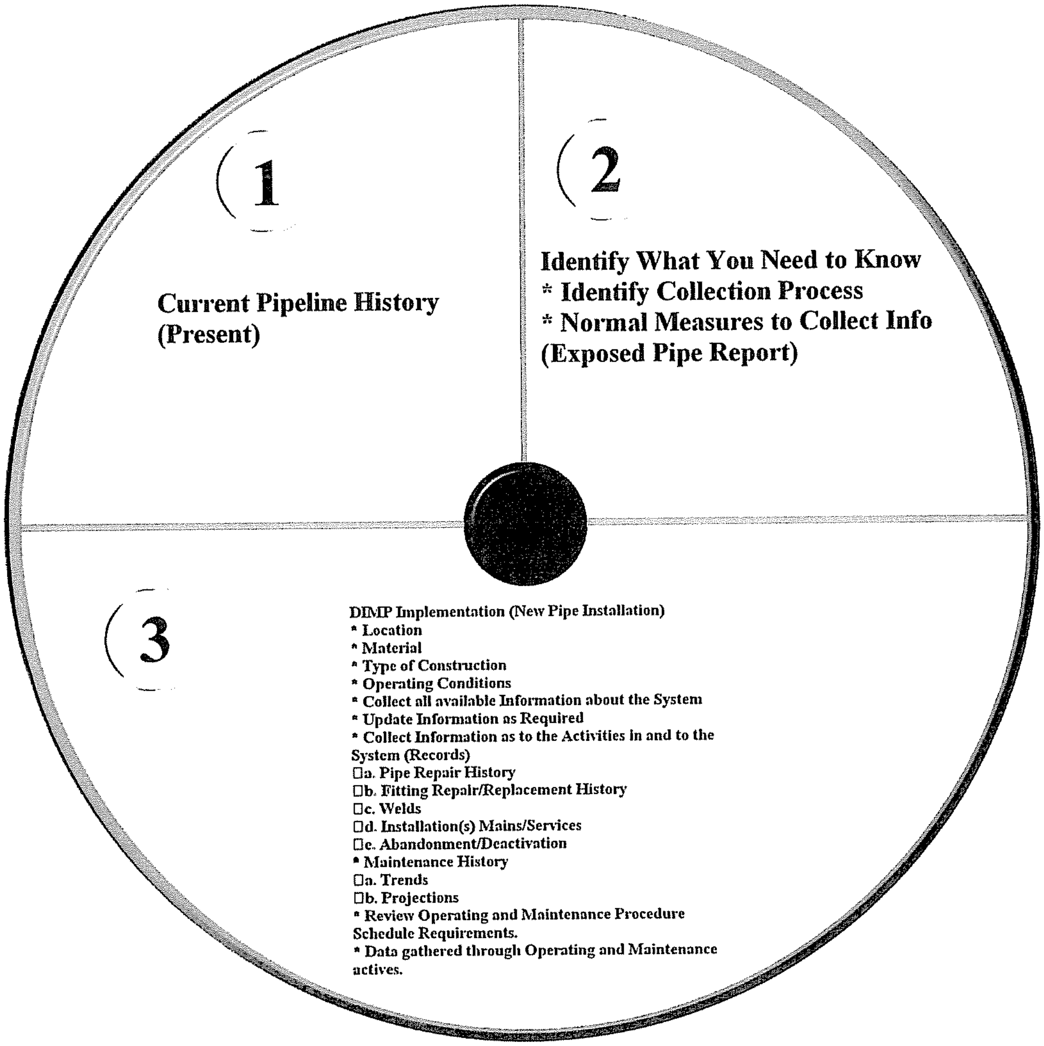

Pipeline History/Knowledge 082050

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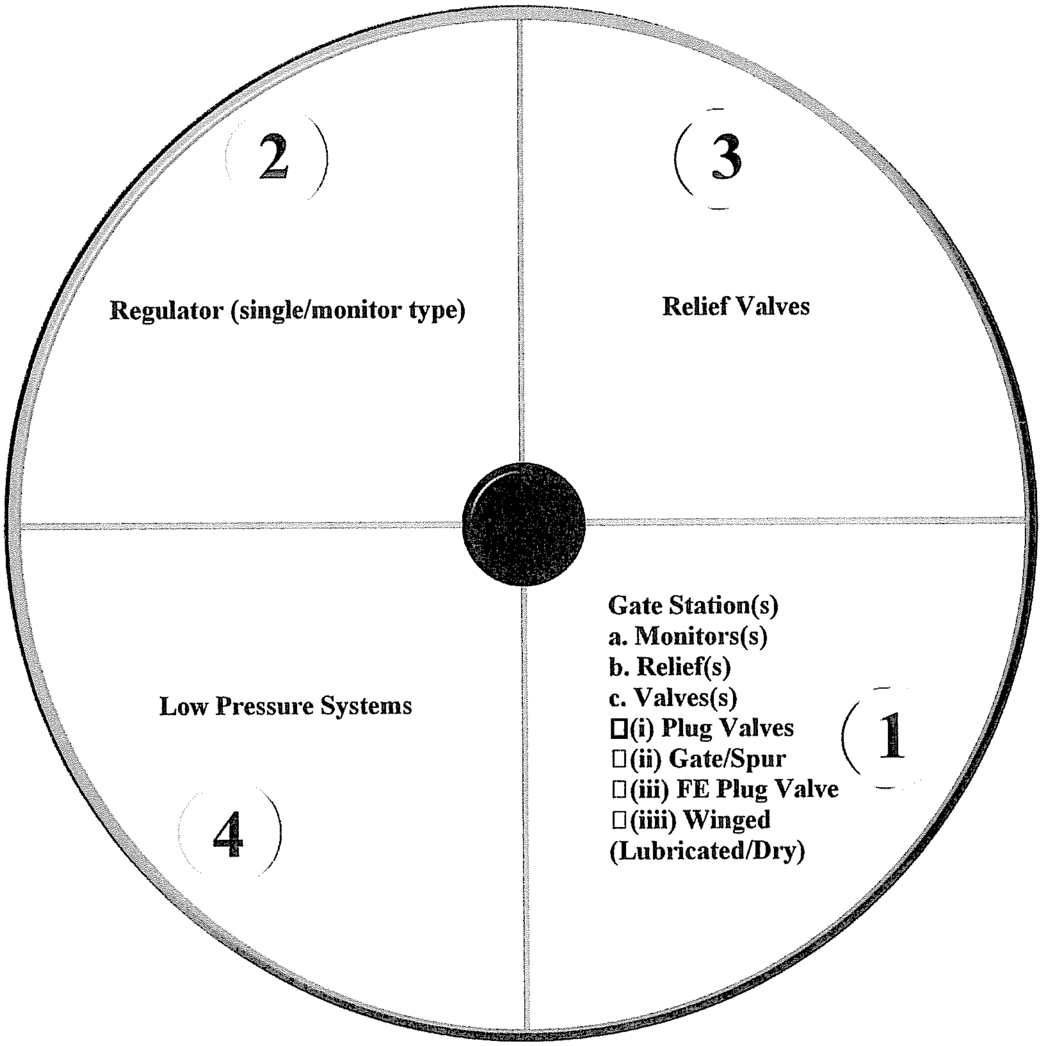

Identify Threats (Regulator Station Failure)

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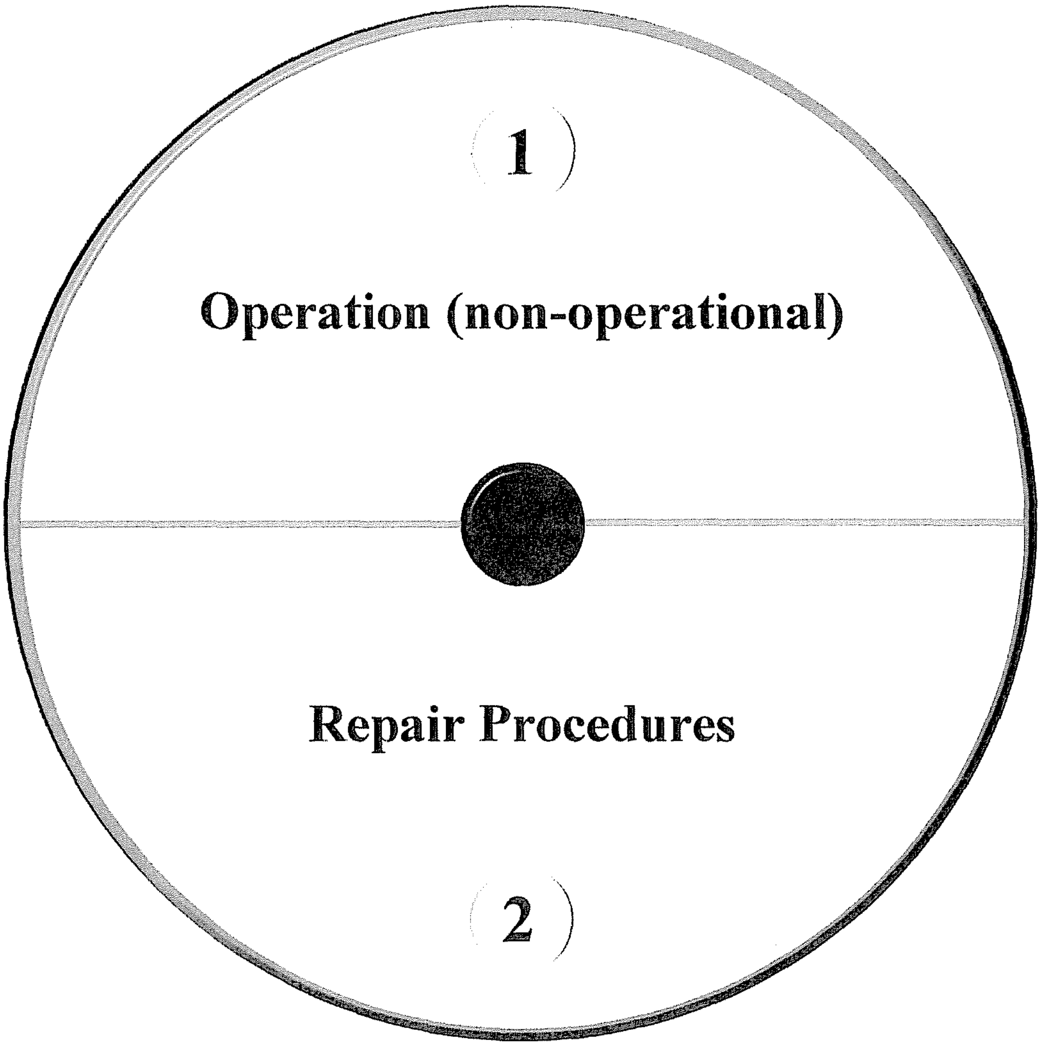

Critical Valves (Plug Valves)

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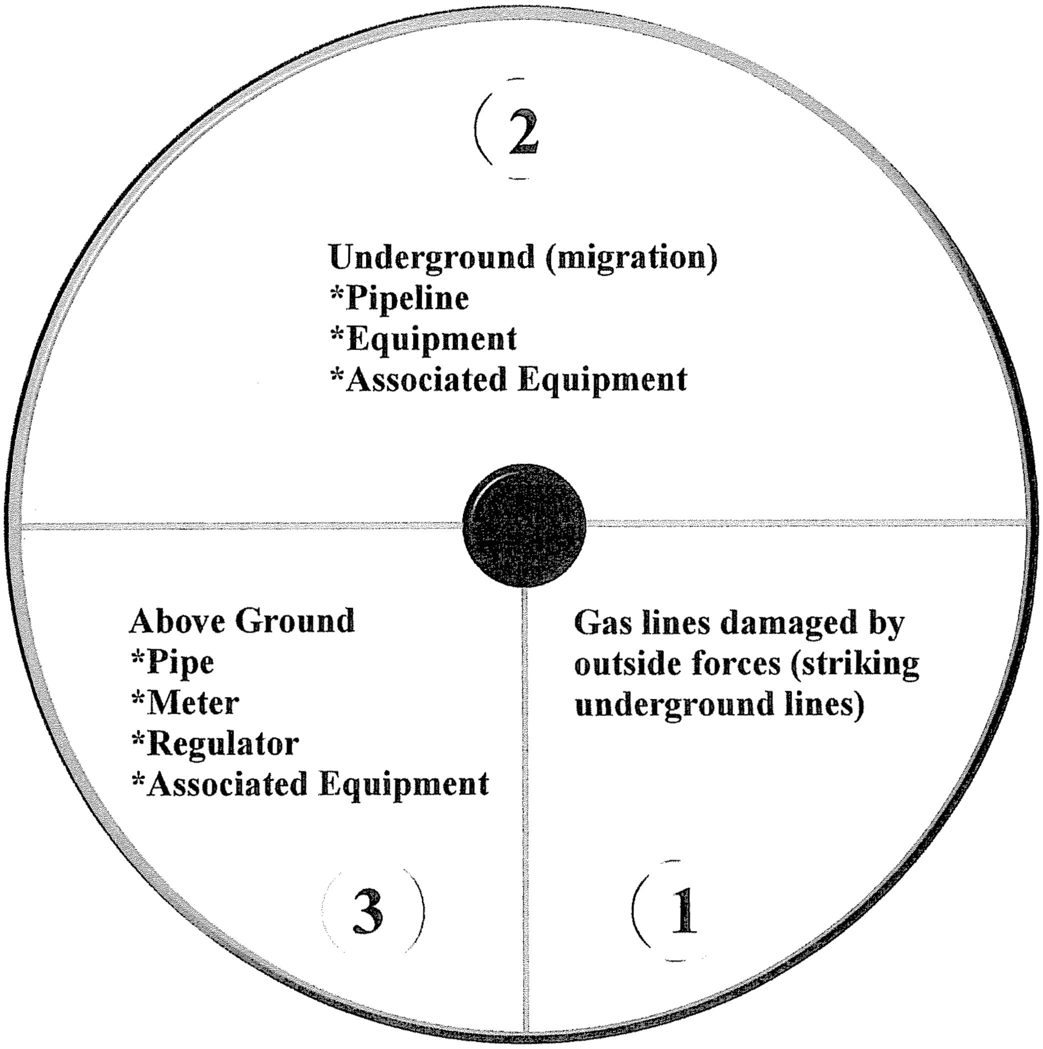
2	



Gas Leaks

1	
2	
3	

Corrosion

1	
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3	

External Corrosion

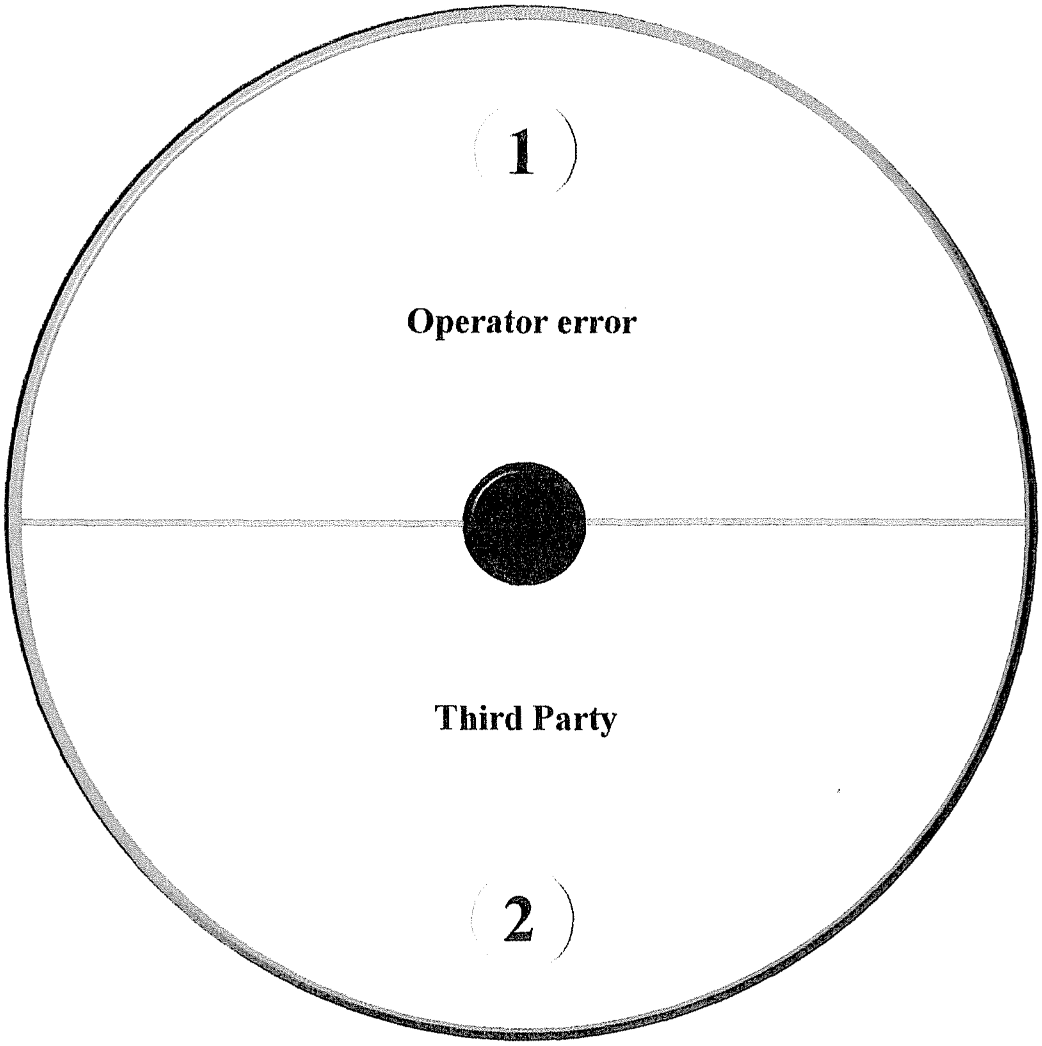
1	
2	
3	

1

Material Failure
* Pipe (cast/steel/PE Plastic)
* Welds
* Weld Components
* Coupling(s)
* Compression Fittings
* Valves
* Flanges
* Meters
* Regulators (Direct Operated)
* Valve Covers (boxes/vaults/pits)
* Clamps (temporary)

Material Failure

1	



Excavation Damage

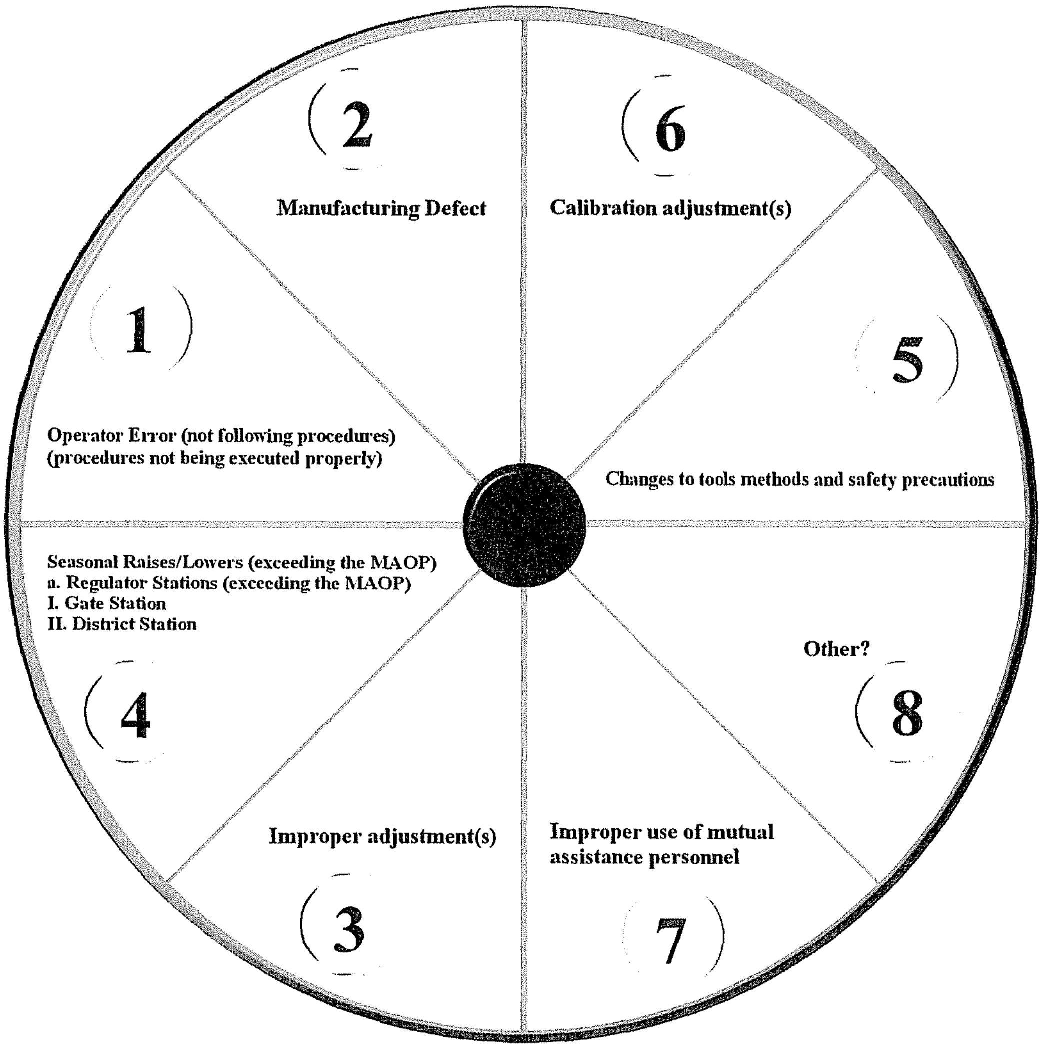
1	
2	

1

* Earthquake
* Seismic Event
* Settlement
* Improper Backfill
* Heaving and Loading
* Washout
* Flooding
* Tornado
* Hurricane
* Thunderstorm
* Lightning Storm(s)
* Acid Rain/Pollutants
* Sink Holes (area)

Natural Forces

1	



Incorrect Operation

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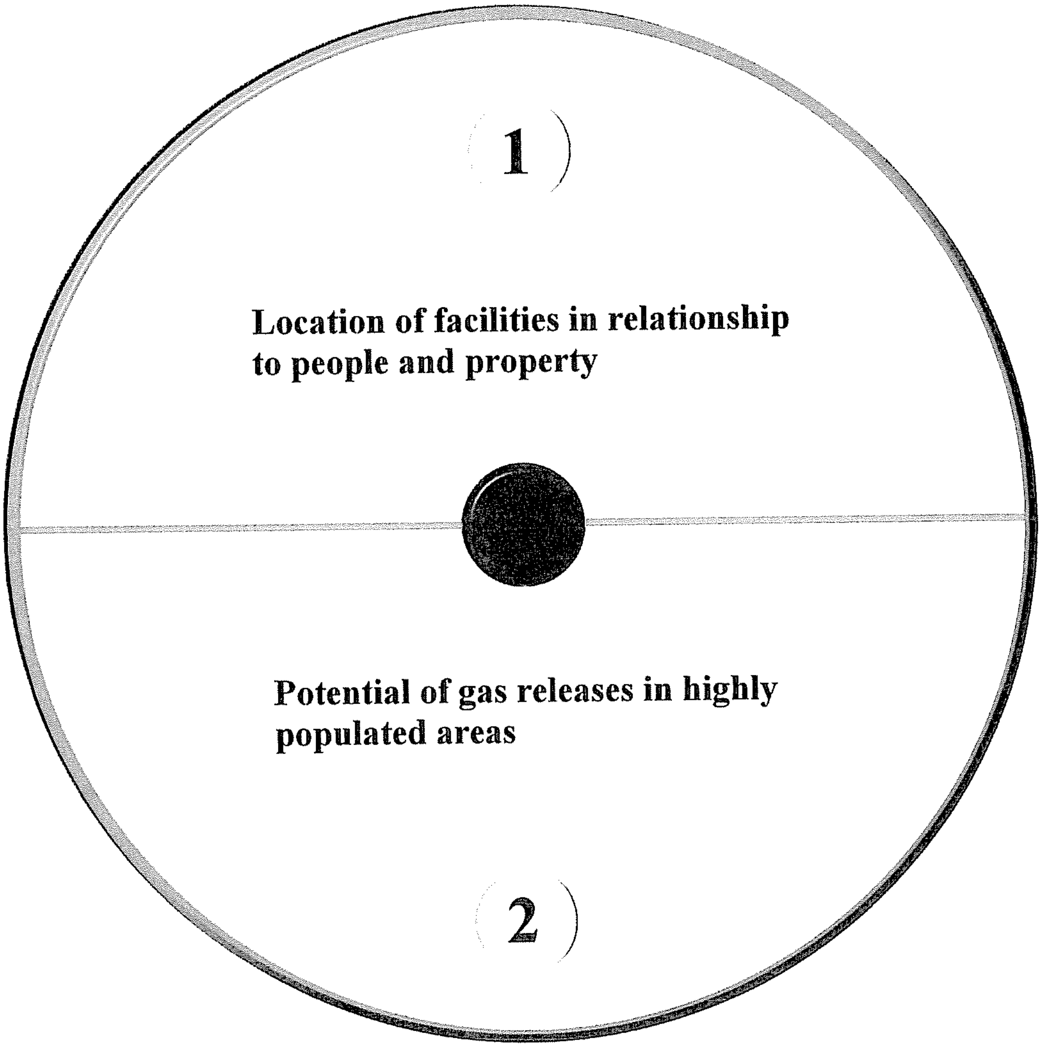

Consequences Factors

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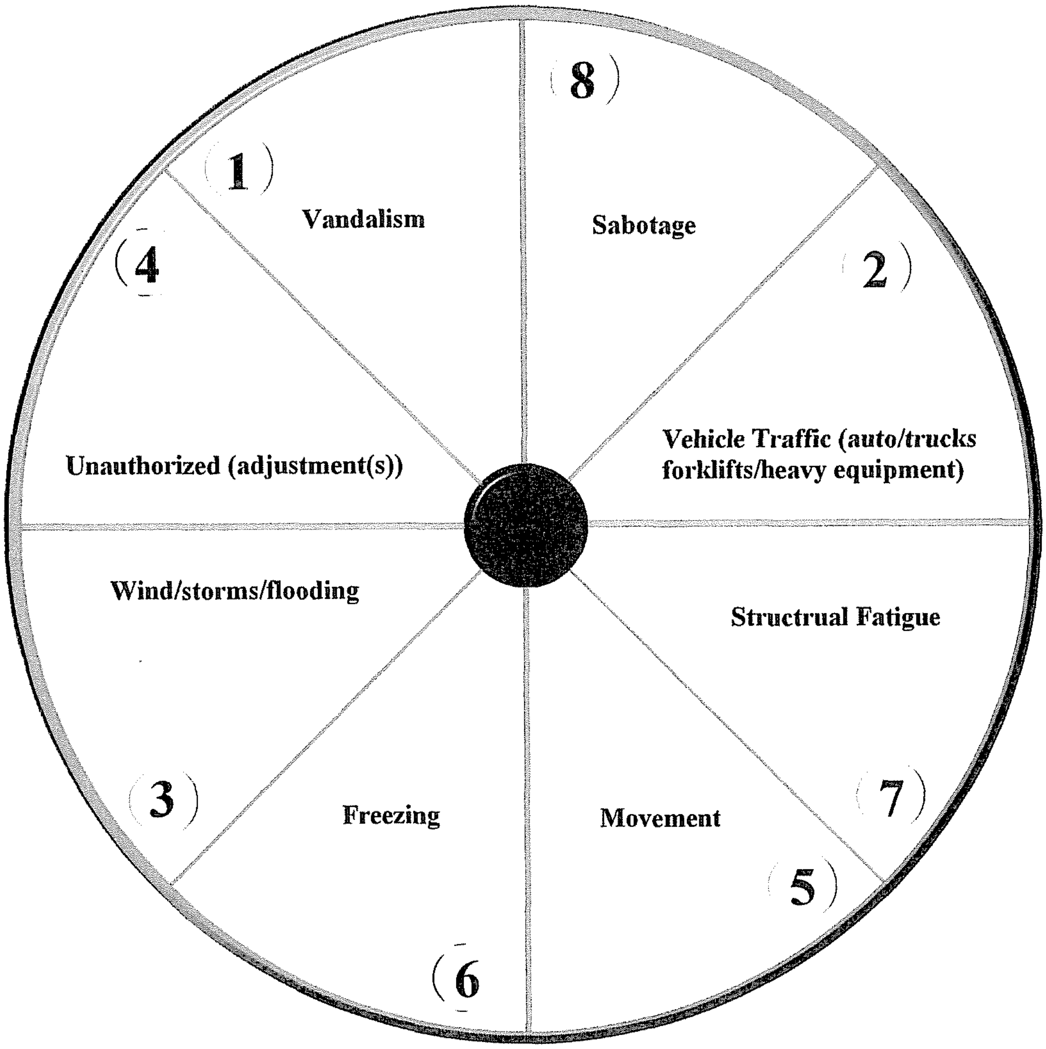
2	



Other Outside Forces (only aboveground facilities)

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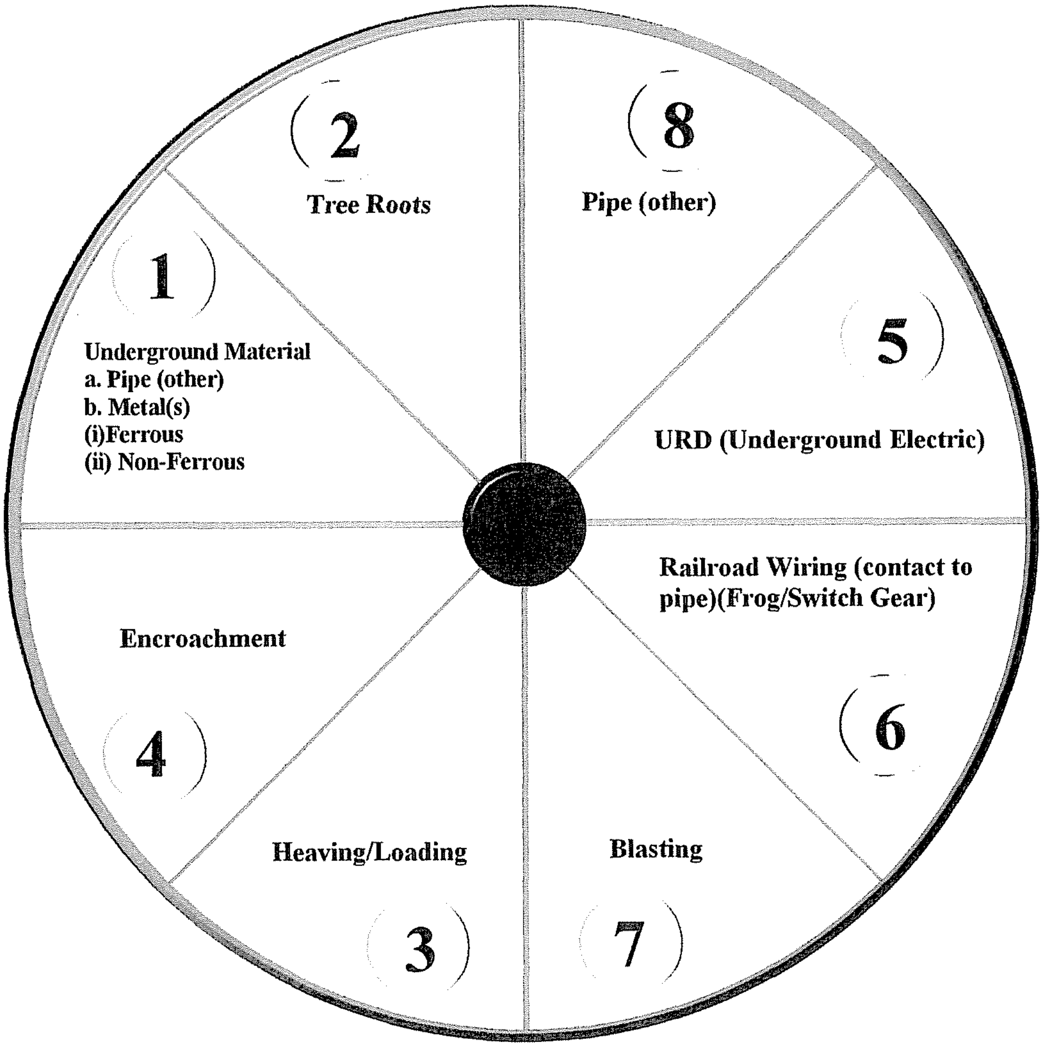

Other Outside Forces (only below ground facilities)

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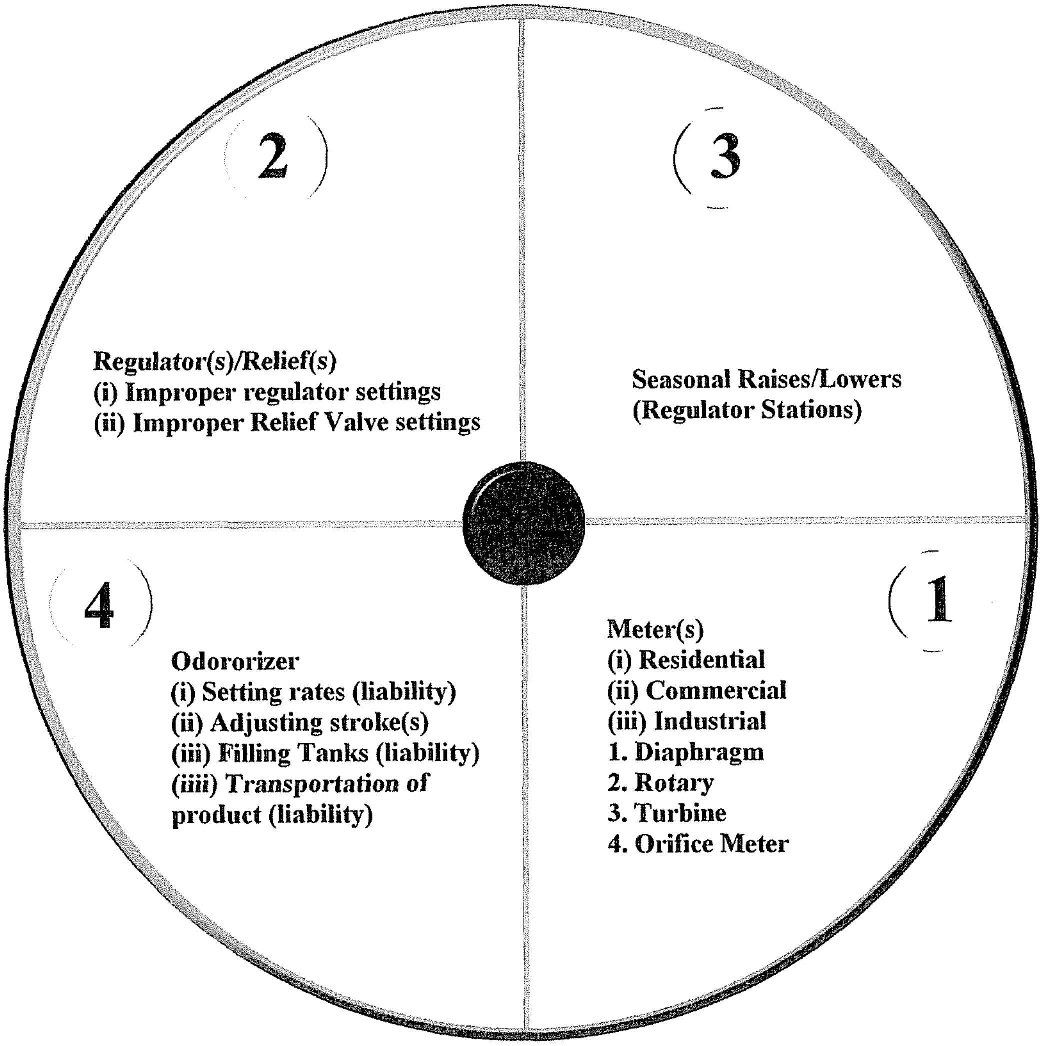
Contractor Digging Education (811)

1	
2	



Operator error (incorrect operations)

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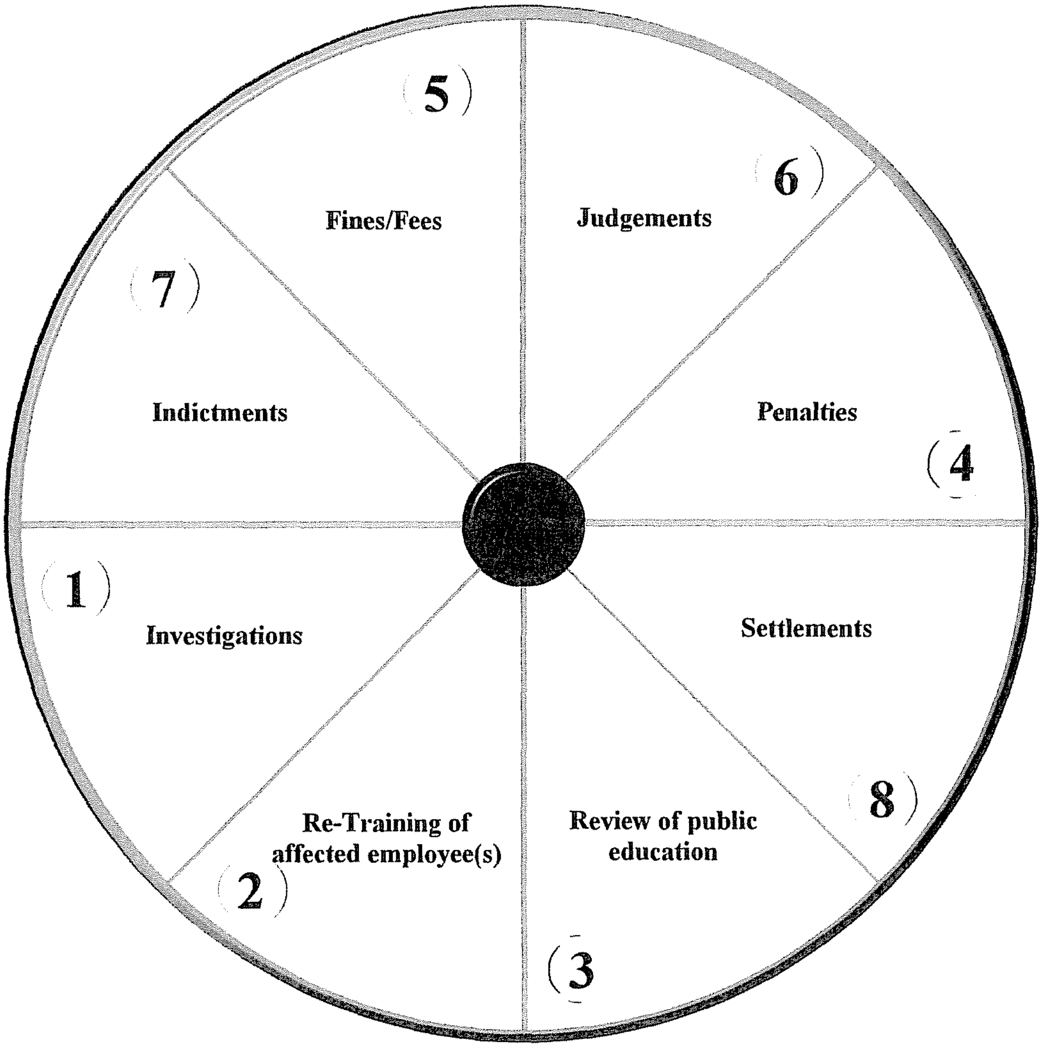

Incidents/Accidents

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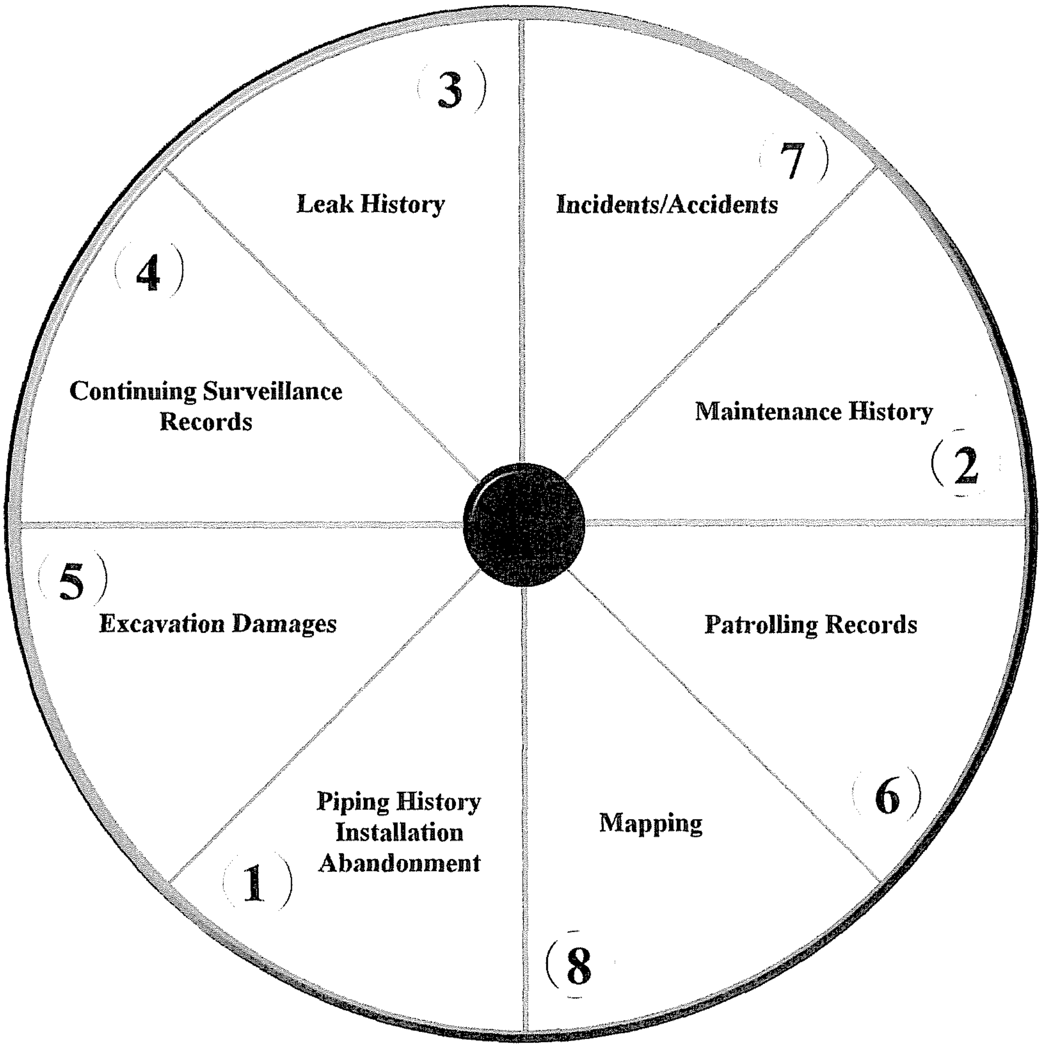

Recordkeeping

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EVALUATE TASKS

Table of Contents

SFI-1.

REGULATOR STATION		
Subject Reporting/Documentation	**Description**	**Rating**
Gate Station	**Pressure reduction station: Pressure reducing devices *control incoming* pressure *to the suitable* desired output pressure.**	**5**

System	Tompkinsville Gas operates (boot type) regulators. All regulators are described as flanged-end-regulators.
Effect	System pressure failure.
Action	Maintenance performed: ❶ Tighten bolts properly (installation, maintenance and PM checks,) ❷ Check for leakage (CGI and soap solution.) ❸ Check for control line blockage. ❹ Check engineering (calculate sizing, length of control lines.) ❺ Perform (tear-down) and inspection (boot, springs, orifices and valve positioners.) ❻ Check operation of regulation (raises and lowering.)

RECORDKEEPING FORMS

REGULATOR INSPECTION HISTORY DATA FORM .... Form 052874- 1
RELIEF VALVE INSPECTION HISTORY DATA FORM .... Form 052874- 2
GAS SYSTEM MAINLINE VALVE MAINTENANCE FORM .... Form 052874- 6
SPECIFIC VALVE LOCATIONS .... Form 052874- 7
REGULATOR SECURITY INSPECTION FORM (GATE/DISTRICT/INDUSTRIAL) .... Form 052874- 14
SECURITY ACCESS KEY ASSIGNMENT FORM .... Form 052874- 15
REGULATOR INSPECTION REPORT WORKING FORM .... Form 052874- 28
RELIEF VALVE INSPECTION REPORT WORKING FORM .... Form 052874- 29

SFI-2.

REGULATOR STATION		
Subject Reporting/Documentation	**Description**	**Rating**
Monitoring Regulation	**Pressure reduction station: Dual-run regulation designed to control the downstream pressure.**	**5**

System	Tompkinsville Gas operates (boot type) regulators. All regulators are described as flanged-end-regulators.
Effect	Over-pressure failure. Elevated pressures exceed delivery pressure.
Action	Maintenance performed: ❶ Tighten bolts properly (installation, maintenance and PM checks,) ❷ Check for leakage (CGI and soap solution.) ❸ Check for control line blockage. ❹ Check engineering (calculate sizing, length of control lines.) ❺ Check settings on both regulators (re-adjust.) ❻ Exercise start up and shutdown of both regulators.

REGULATOR INSPECTION HISTORY DATA FORM .... Form 052874- 1
RELIEF VALVE INSPECTION HISTORY DATA FORM .... Form 052874- 2
GAS SYSTEM MAINLINE VALVE MAINTENANCE FORM .... Form 052874- 6
SPECIFIC VALVE LOCATIONS .... Form 052874- 7
REGULATOR SECURITY INSPECTION FORM (GATE/DISTRICT/INDUSTRIAL) .... Form 052874- 14
SECURITY ACCESS KEY ASSIGNMENT FORM .... Form 052874- 15
REGULATOR INSPECTION REPORT WORKING FORM .... Form 052874- 28
RELIEF VALVE INSPECTION REPORT WORKING FORM .... Form 052874- 29

SFI-3.

REGULATOR STATION		
Subject Reporting/Documentation	**Description**	**Rating**
Regulator Station Valve(s)	**Used as the means to shutdown and open flow through a pipeline system.**	**5**

System	Flanged-end-plug valves used for control of the system.
Effect	Type valves employed are lubricated valves. Control valves are gated (Hoke) valve. Valves must operate with ease to control flows.
Action	Valves must be operated, and checked for leakage. Valves must be greased only if the valve is non-operational, as well as leaking. (192.145, 147, 181, 191, 197, 199, 363, 365, 379, 381, 747.)

REGULATOR INSPECTION HISTORY DATA FORM .... Form 052874- 1
RELIEF VALVE INSPECTION HISTORY DATA FORM .... Form 052874- 2
GAS SYSTEM MAINLINE VALVE MAINTENANCE FORM .... Form 052874- 6
SPECIFIC VALVE LOCATIONS .... Form 052874- 7
REGULATOR SECURITY INSPECTION FORM (GATE/DISTRICT/INDUSTRIAL) .... Form 052874- 14
SECURITY ACCESS KEY ASSIGNMENT FORM .... Form 052874- 15
REGULATOR INSPECTION REPORT WORKING FORM .... Form 052874- 28
RELIEF VALVE INSPECTION REPORT WORKING FORM .... Form 052874- 29

SFI-4.

REGULATOR STATION		
Subject Reporting/Documentation	**Description**	**Rating**
Security (Regulation) Valve(s)	**Used as the means to shutdown a pipeline system.**	**5**

System	Flanged-end-security valves are used to shutdown a system due to regulator failure.
Effect	Tompkinsville Gas employ security (Slam-Shut) valves to protect the system against over-pressurization.
Action	Security valves inspection involves the following: ❶ Check Control lines for (blockage.) ❷ Check for leakage at the control line ends (pressure leaking down/mask pressure buildup.) ❸ Check (Trip) setting to ensure accurate set point.

SFI-6.

REGULATOR STATION		
Subject Reporting/Documentation	**Description**	**Rating**
Low Pressure System	**Low Pressure systems operate at 11" WC or less.**	**0**

System	Tompkinsville Gas does not posses a low pressure system.
Effect	N/A
Action	N/A

SFI-7.

REGULATOR STATION		
Subject Reporting/Documentation	**Description**	**Rating**
Customer Regulation (Direct Operated Regulator.)	**Pressure reducing devices control incoming pressure to the suitable desired output pressure (7" WC.)**	**5**

System	Tompkinsville Gas operate "Direct Operated" service regulators for controlling the Intermediate Pressure (15-30 psig.)
Effect	The customer regulator(s) receive a range of pressure of (15-30 psig) and reduces the elevated pressure to (.25 psig)(7" WC.) The regulators posses an internal relief valve (IRV), which purges the excess gas pressure to the atmosphere.
Action	Customer regulators are check for operation if gas is purging from the regulator vent. Regulators are inspected when the change for age program dictates a change to the gas meter. Inspections to a customers regulator is based on the O&M requirement of (As Needed.)

MAIN AND SERVICE INSTALLATION .... Form 052874- 21
MAIN AND SERVICE ABANDONMENT .... Form 052874- 22
SERVICE REQUEST/METER SET .... Form 052874- 23
MECHANICAL FITTING FAILURE FORM .... Form 052874- 26
ATMOSPHERIC CORROSION FORM .... Form 052874- 27
LEAK SURVEY LOG .... Form 052874- 30

SFI-10.

VALVE (Critical/Secondary)		
Subject Reporting/Documentation	**Description**	**Rating**
Secondary Valve(s)	**Valves used to isolate the downstream flow on secondary systems (side streets, alley ways) by placing the valve in the off position. Valves used to initiate or establish the flow of gas to an opertional system.**	**5**
System	Mechanical equipment (valve) used to operate Tompkinsville Gas side street, alley ways and dedicated plant and factory valves. This operation is performed to discontinue the flow of gas and to establish the flow of gas. Valves located on by-pass facilities are used during emergency and maintenance work.	
Effect	Valves that are non-operational may cause over-pressurization on a system, if the system can not be terminated. Striking of gas pipelines that result in blowing gas must have valves that are completely operational. Loss of gas to a system (requiring shutdown and re-establish of services.)	
Action	Valves shall be recorded as to their location (GPS and/or measurements.)Valves must be operated, and checked for leakage. Valves must be greased only if the valve is non-operational, as well as leaking. (192.145, 147, 181, 191, 197, 199, 363, 365, 379, 381, 747.)	

SFI-11.

PIPELINE DAMAGE (Outside Forces)		
Subject Reporting/Documentation	**Description**	**Rating**
Damage by outside forces.	**Striking underground facilities (pipeline, equipment and associate system) by third parties. Damage by seismic events, frost, heaving and loading, settling (structure, backfilling, heavy weights) can create breakage and leakage.**	**5**

System	Underground mains and services serving Tompkinsville Gas customers.
Effect	Struck lines by third party or operator error allow for dire consequence. Damaged gas pipelines allow natural gas to migrate (travel) from the point of origin to areas of dangerous confinement. Seismic events as defined in the **"Description."**
Action	❶ Provide greater education to the public (consumers, contractors, and gas personnel) concerning call before you dig laws (811.) ❷ Monitor "Locate Numbers" to ensure completion. ❸ Respond to calls of struck lines in a timely manner. ❹ Set up zones when arriving (Hot, Warm and Cold Zone) to ensure public and personnel safety. ❺ Qualified personnel, supplies and equipment delivered to the incident area. ❻ Terminate gas flow to damaged area. ❼ Make repairs. ❽ Restore service.

SFI-12.

PIPELINE DAMAGE (Outside Forces)		
Subject Reporting/Documentation	**Description**	**Rating**
Damage by outside forces.	**Striking aboveground facilities (pipeline, equipment and associate system) by third parties.**	**5**

System	Tompkinsville Gas provides aboveground facilities for safe delivery of natural gas to the customer : ❶ Gas meters (industrial, commercial and residential.) ❷ Regulators (gate, district, industrial, and residential.) ❸ Block valves ❹ Vent casings (road crossings, railroad tracks, culverts.)
Effect	Damage by third party or the public (vehicles, construction, vandalism) can create dire consequences. Struck gas equipment can cause gas to purge to the (atmosphere, surrounding area, and to be pulled into building structures) allowing potentials for gas ignition, resulting in possible death, injury and property damage.
Action	In the event of natural gas equipment being struck by third party and/or the public, Tompkinsville Gas will take action as follows: ❶ Respond to calls of struck lines in a timely manner. ❷ Set up zones when arriving (Hot, Warm and Cold Zone) to ensure public and personnel safety. ❸ Qualified personnel, supplies and equipment delivered to the incident area. ❹ Terminate gas flow to damaged area. ❺ Make repairs. ❻ Restore service.

GAS SYSTEM MAINLINE VALVE MAINTENANCE FORM .... Form 052874- 6
SPECIFIC VALVE LOCATIONS .... Form 052874- 7
GAS SYSTEM CASING VENT INSPECTION FORM .... Form 052874- 8
LEAK SURVEY REPORT FORM .... Form 052874- 9
PATROLLING DISTRIBUTION SYSTEM FORM .... Form 052874- 10
THIRD PARTY EXCAVATION INSPECTION REPORT FORM .... Form 052874- 11
VISUAL INSPECTION OF MAINS AND SERVICE PIPELINES FORM .... Form 052874- 12
PIPELINE PRESSURE TESTING RECORDS FORM .... Form 052874- 13
SAFETY RELATED CONDITION REPORT/APPENDIX III .... Form 052874- 18
ODOR COMPLAINT ORDER .... Form 052874- 20
MAIN AND SERVICE INSTALLATION .... Form 052874- 21
MAIN AND SERVICE ABANDONMENT .... Form 052874- 22
MECHANICAL FITTING FAILURE FORM .... Form 052874- 26
ATMOSPHERIC CORROSION FORM .... Form 052874- 27
LEAK SURVEY LOG .... Form 052874- 30

SFI-14.

CORROSION		
Subject Reporting/Documentation	**Description**	**Rating**
Corrosion (external)	**Damage by corrosion (natural and manmade) to a piping system and/or equipment associated with natural gas pipelines. Factors affecting pipelines may range from: Sulfuric, carbonic and bacterial.**	**5**

System	Tompkinsville Gas provides protection (CP) for it's pipeline and associated facilities: ❶ Anodic protection (properly sized anodes.) ❷ Bonded insulators. ❸ Test lead stations.
Effect	Corrosion can lead to leaks and line breakage placing the public in danger of the effects of leaking natural gas. Corrosion can reduce the life of the pipeline (incurring costs associated with replacement.)
Action	The following are checks and corrective actions taken: ❶ Corrosion Surveys. a. Spot/annual (1/5th of system each year.) b. Cast Iron/Ductile c. Steel 1. Bare 2. Coated (Protected) 3. Coated (Un-protected) 4. Soil types (acidic reactions/pH changes.) d. Isolated metal sections of PE ❷ Pipe-to-Soil reading checks. (Type piping system.) ❸ Leak Survey and Patrolling. a. Mobile b. Walking ❹ Grounding of gas lines by electricians (un-intentional.) ❺ Materials welds and then joint failures ❻ Construction defects (support during construction and backfilling)

GAS SYSTEM MAINLINE VALVE MAINTENANCE FORM .... Form 052874- 6
PIPE-TO-SOIL SURVEY .... Form 052874- 16
RECTIFIER INSPECTION FORM .... Form 052874- 17

SFI-15.

CORROSION		
Subject Reporting/Documentation	**Description**	**Rating**
Corrosion (internal)	**Damage by corrosion (natural and manmade) to a piping system and/or equipment associated with natural gas pipelines.**	**5**

System	Tompkinsville Gas provides equipment to eliminate the entrance of (distillates, compressor oils, water) for the pipeline and associated facilities: ❶ Scrubber (cleans pipe system of distillates)(replaceable filter.) ❷ In-line filters (filters dirt, debris and slag)(removable filter.) ❸ Drips and traps.
Effect	Corrosion can lead to leaks and line breakage placing the public in danger of the effects of leaking natural gas. Corrosion can reduce the life of the pipeline (incurring costs associated with replacement.)
Action	The following are checks and corrective actions taken: ❶ Corrosion Surveys. a. Spot/annual (1/5th of system each year.) b. Cast Iron/Ductile c. Steel 1. Bare 2. Coated (Protected) 3. Coated (Un-protected) d. Isolated metal sections of PE ❷ Pipe-to-Soil reading checks. (Type piping system.) ❸ Leak Survey and Patrolling. a. Mobile b. Walking ❹ Grounding of gas lines by electricians (un-intentional.) ❺ Elimination of copper pipe (associated with .08 % sulfur in odorant.)(Sulfuric crystals.)

GAS SYSTEM MAINLINE VALVE MAINTENANCE FORM .... Form 052874- 6
PIPE-TO-SOIL SURVEY .... Form 052874- 16
RECTIFIER INSPECTION FORM .... Form 052874- 17

SFI-16.

CORROSION		
Subject Reporting/Documentation	**Description**	**Rating**
Corrosion (atmospheric)	**Damage by corrosion (natural and manmade) to a piping system and/or equipment associated with natural gas pipelines.**	**5**

System	Tompkinsville Gas provides surveys to evaluate the conditions of exposed pipe and associated equipment above ground and in valve boxes.
Effect	Pipe and associated equipment exposed to the effects of sunlight and ultra-violet rays as well as sulfuric, carbonic and bacteria may cause severe corrosion and deterioration.
Action	Surveys provide a detailed list of pipe and associated equipment needing coating or jacketing. Paint to coat and protect shall be a zinc-cadmium based product. The following items shall be addressed by coating: ❶ Exposed pipe. ❷ Regulator Stations (Gate/District/Farm-Taps.) ❸ Meter(s) ❹ Protective Post/Barricades/Bollards/Parapets. ❺ Wrapping (check quash or voids.) Improper wrapping.

ATMOSPHERIC CORROSION FORM .... Form 052874- 27

SFI-17.

EXCAVATION		
Subject Reporting/Documentation	**Description**	**Rating**
Excavation Third Party/Operator Error.)	**During excavation (third parties/operator) of pipelines which result in the striking of underground facilities.**	5

System	Tompkinsville Gas is an active member of the 811 One-Call System.
Effect	Pipe and associated equipment may be susceptible to striking of pipelines and associated equipment by (third party/operator.) These incidents are usual caused due to a lack of information as to the location of the pipe underground.
Action	Tompkinsville Gas is an active member of the 811 One-Call System. Tompkinsville Gas monitors a "Locate" database, which initiates the locating of underground lines in a 48 hours time line. Education of the 811 Call-Before-You-Dig (Damage Prevention Coordinating Council) and information shall be issued to the public under the Public Awareness Plan notification measures (flyers, bill stuffers, newspaper, radio and TV announcements.) Public Liaisons Meetings. Measures to prevent further incidents related to excavation: ❶ Immediate response to odor calls. ❷ Patrolling construction site, railroad, road work areas, demolition, farming, and blasting. ❸ Unusually high "Un-accounted For" gas reports/audits.

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LEAK SURVEY REPORT FORM .... Form 052874- 9
PATROLLING DISTRIBUTION SYSTEM FORM .... Form 052874- 10
THIRD PARTY EXCAVATION INSPECTION REPORT FORM .... Form 052874- 11
VISUAL INSPECTION OF MAINS AND SERVICE PIPELINES FORM .... Form 052874- 12
PIPELINE PRESSURE TESTING RECORDS FORM .... Form 052874- 13
INSPECTION OF GAS MAINS ON BRIDGES/APPENDIX IV .... Form 052874- 19
ODOR COMPLAINT ORDER .... Form 052874- 20
MAIN AND SERVICE INSTALLATION .... Form 052874- 21
MAIN AND SERVICE ABANDONMENT .... Form 052874- 22
MECHANICAL FITTING FAILURE FORM .... Form 052874- 26
LEAK SURVEY LOG .... Form 052874- 30

SFI-18.

EQUIPMENT FAILURE		
Subject Reporting/Documentation	**Description**	**Rating**
Equipment failure and components.	**Equipment failure such as measuring devices, meters, regulators, scrubbers, filters, strainers, and telemetering equipment which may fail in safe mode or may fail causing an incident.**	**5**

System	Tompkinsville Gas system is protected by such equipment to render the system safe.
Effect	Regulators may fail open or closed. If regulator(s) fail, they may exceed the MAOP of the system: ❶ Regulators (residential.) a. Residential (Direct-Operated Regulator. 1. Internal Relief Valve (IRV) b. Commercial Regulators. 1. IRV, over-pressure and under-pressure shutdown. c. Industrial Regulators. 1. IRV, pneumatic amplifiers, dynamic boosters. ❷ Meters. a. Diaphragm (type.) b. Rotary (type.) c. Turbine (type.) ❸ Valves. a. Critical Valves (FE Plug, Gate, Globe, Wingcock)(Steel/Malleable.) b. Secondary Valves (Steel/Malleable, Stainless Steel, Brass, PE.) ❹ Odorizers. a. Injection b. By-pass/Sweep c. Wick ❺ Pipeline Heaters. (Boiler.)(Scotch Marine Type.) a. Fire Tubed. 1. Firing Rate. 2. Air adjustment. 3. Glycol (Un-inhibited.) b. Catalyst (Control Line.)
Action	Tompkinsville Gas has an active maintenance schedule which meets 192 compliance. The following equipment shall be kept in safe operation at all times: ❶ Performed maintenance, checks and surveys.) ❷ Preventive maintenance (scheduled and periodic.) ❸ Major inspections. ❹ Equipment brought up to standards. ❺ Following proper procedures (operation/maintenance.)

GAS SYSTEM MAINLINE VALVE MAINTENANCE FORM .... Form 052874- 6
ODOR COMPLAINT ORDER .... Form 052874- 20
MECHANICAL FITTING FAILURE FORM .... Form 052874- 26

SFI-21.

MATERIAL FAILURE		
Subject Reporting/Documentation	**Description**	**Rating**
Material and component failure.	**Material failure such as pipe, regulator(s), meter(s), valves, fittings, flanges, welds, valve-box and stand-pipe.**	**5**

System	Tompkinsville Gas system uses all mentioned materials and maintains such materials by patrolled and surveyed to render the system safe.
Effect	Regulators may fail open or closed. The following equipment shall be kept in safe operation at all times: ❶ Regulators (residential.)(aluminum/cast alloys.) a. Residential (aluminum/cast alloys.) b. Commercial Regulators (aluminum/cast alloys.) c. Industrial Regulators. (aluminum/cast alloys.) ❷ Meters. a. Diaphragm (type.)(aluminum/cast alloys.) b. Rotary (type.)(aluminum/cast alloys.) c. Turbine (type.)(aluminum/malleable alloys.) ❸ Valves. a. Critical Valves (cast/malleable/mild-steel/stainless steel/brass and PE.) b. Secondary Valves (cast/malleable/mild-steel/stainless steel/brass and PE.) ❹ Odorizers. (malleable/mild-steel/stainless steel/brass.) ❺ Pipeline Heaters. (cast/malleable/mild-steel/stainless steel/brass.) ❻ Pipe. (Cast iron/malleable.) ❼ Gaskets/Bolts/Nuts.
Action	Tompkinsville Gas maintains a scheduled and emergency workforce and on-call personnel for such failures: ❶ Performed maintenance, checks and surveys. (material faults.) ❷ Preventive maintenance (scheduled and periodic.) ❸ Inspections.(Random inspections, material.) ❹ Equipment brought up to standards. (Change out worn, defective, aged material.) ❺ Following proper procedures (operation/maintenance.) ❻ Cast iron replacement. (On going.)(Current.)

GAS SYSTEM MAINLINE VALVE MAINTENANCE FORM .... Form 052874- 6
ODOR COMPLAINT ORDER .... Form 052874- 20
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SFI-22.

NATURAL FORCES		
Subject Reporting/Documentation	**Description**	**Rating**
System damage and/or failure.	**Natural forces can damage equipment controlling the system.**	**5**

System	Tompkinsville Gas system uses communication systems to access a problem and render it safe. Maps are used to communicate locations, addresses, accounting information.
Effect	Natural forces menacing natural gas systems are as follows: a. Earthquake b. Seismic events c. Settlement d. Improper backfill e. Heaving and loading f. Washout g. Flooding h. Tornado i. Hurricane j. Thunderstorm k. Lightning storms l. Acid rain and other pollutants m. Sinkholes
Action	Tompkinsville Gas maintains an emergency workforce and on-call personnel for such disasters: ❶ Performed Public Liaisons Meetings. a. Exchange action information with first responders. b. Exchange contact phone numbers/radio numbers. c. Establish "Command Post" location. d. Prepare material and supplies at command post location. e. Set assignments (personnel.) ❷ Implement Public Awareness Plan notifications. ❸ Perform mock exercises. ❹ Keep system in good operating condition. ❺ Following proper procedures (emergency/operation.) ❻ Render all abnormal operating conditions safe.

GAS SYSTEM MAINLINE VALVE MAINTENANCE FORM .... Form 052874- 6
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VISUAL INSPECTION OF MAINS AND SERVICE PIPELINES FORM .... Form 052874- 12
SAFETY RELATED CONDITION REPORT/APPENDIX III .... Form 052874- 18
ODOR COMPLAINT ORDER .... Form 052874- 20
MECHANICAL FITTING FAILURE FORM .... Form 052874- 26

SFI-25.

OTHER OUTSIDE FORCES		
Subject Reporting/Documentation	**Description**	**Rating**
System damage and/or failure. (Above ground facilities.)	**Other outside forces and conditions will affect a system and can damage equipment controlling the system.**	**5**

System	Tompkinsville Gas system uses communication systems to access a problem and render it safe. Maps are used to communicate locations, addresses, accounting information.
Effect	Forces menacing natural gas systems are as follows: ❶ Vandalism. ❷ Vehicle Traffic. a. Automobile. b. Trucks. c. Forklifts. d. Heavy Equipment. ❸ Wind/Storms/Flooding. ❹ Unauthorized adjustment(s). a. Tampering with regulation and measurement devices. ❺ Movement. ❻ Freezing. ❼ Structural Fatigue. a. Eliminate strain on customer owned fuel lines. b. Eliminate foundation undermining. ❽ Sabotage. a. Train as to how to deal with such events. b. Contact local EMA/Homeland Security offices.
Action	Tompkinsville Gas maintains an emergency workforce and on-call personnel for such occurrences: ❶ Anticipate maintenance and repairs. ❷ Enlist a Mutual Assistance Agreement with surrounding qualified responders SISC.) ❸ Periodic checks of system to ensure proper operation. ❹ Keep system in good operating condition as to withstand unforseen forces. ❺ Following proper procedures (emergency/operation.) ❻ Render all abnormal operating conditions safe.

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SFI-26.

OTHER OUTSIDE FORCES		
Subject Reporting/Documentation	**Description**	**Rating**
System damage and/or failure. (Underground facilities.)	**Other outside forces and conditions will affect a system and can damage equipment controlling the system.**	**5**

System	Tompkinsville Gas system uses communication systems to access a problem and render it safe. Maps are used to communicate locations, addresses, accounting information.
Effect	Forces menacing natural gas systems underground are as follows: ❶ Underground environment. a. Chemicals. b. pH changes. c. Metal contact (Galvanic reactions.) 1. Ferrous alloys 2. Non-Ferrous alloys. ❷ Vegetation. a. Tree roots. ❸ Heaving/Loading. ❹ Encroachment. ❺ URD (Underground Electric.) ❻ Railroad Wiring. a. Contact piping. b. Frog/switch gear. ❼ Overhead Transmission Towers (180,000 volt interference/drift.) ❽ Electric fencing (cattle fence/shock fencing.)
Action	Tompkinsville Gas maintains an emergency workforce and on-call personnel for such occurrences: ❶ Anticipate maintenance and repairs. ❷ Enlist a Mutual Assistance Agreement with surrounding qualified responders SISC.) ❸ Periodic checks of system to ensure proper operation. ❹ Keep system in good operating condition as to withstand unforseen forces. ❺ Following proper procedures (emergency/operation.) ❻ Render all abnormal operating conditions safe.

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SFI-27.

INCORRECT OPERATIONS		
Subject Reporting/Documentation	**Description**	**Rating**
Gas system not properly operated. (Operator error.)	**Proper procedures (manufacture/operator)(most restrictive) not followed correctly.**	**5**

System	Tompkinsville Gas system employs Gas Operator Qualified trained and tested personnel.
Effect	Incorrect operations may cause system failure, up to an including death, injury and property damage: ❶ Operator error (not following procedures.) a. Regulator (adjustments.) b. Over-pressure protection (adjustments.) c. Odorizer (adjustments.) 1. Setting rates. 2. Adjusting stroke. 3. Filling tank. 4. Transporting of product (odorant.) ❷ Manufacturing Defects (affect operations.) ❸ Improper adjustments. ❹ Seasonal raises/lowers (exceeding the MAOP.) ❺ Changes to new tool methods and safety precautions. ❻ Calibration adjustments. ❼ Mutual Assistance personnel not properly trained and qualified.
Action	Tompkinsville Gas maintains an emergency workforce and on-call personnel for such occurrences: ❶ Respond to malfunction.. ❷ Replace or repair damaged or malfunctioning equipment. ❸ Periodic checks of system to ensure proper operation. ❹ Keep system in good operating condition as to withstand unforseen miscalculations. ❺ Following proper operating procedures. ❻ Render all abnormal operating conditions safe. ❼ Re-train personnel. ❽ Evaluate personnel's behavior (possible drug/alcohol test.)

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Distribution Integrity Management Program (DIMP)

Inspection Form

For Operators of Gas Distribution Systems

For Requirements of 192.1005 – 192.1011

Version 9/23/2011

This inspection form is for the evaluation of a gas distribution integrity management program for all operators of gas distribution except operators of master meter or small liquefied petroleum gas (LPG) systems. The form contains questions related to specific regulatory requirements and questions which are strictly for informational purposes. The questions which are related to specific regulatory requirements are preceded by the rule section number which ·escribes the applicable code citation for the question. The cell preceding informational questions states "information .ly".

S/Y stands for "Satisfactory" or "Yes", U/N stands for "Unsatisfactory" or "No", N/A stands for "Not Applicable", and N/C stands for "Not Checked". If an item is marked U/N, N/A, or N/C, an explanation must be included in the comments section.

Some inspection questions contain examples to further clarify the intent of the question. For example, question 5 asks, "Do the written procedures require the consideration of information gained from past design, operations, and maintenance (e.g. O&M activities, field surveys, One-Call system information, excavation damage, etc.)?" The list following "e.g." is not meant to be all inclusive or that all the items are required. Some of the items may not be applicable to an individual operator's system.

Some States require the operator to notify and send the State regulatory authority any changes to operator's plans and procedures. Operators in these states should also notify and send revisions of the DIMP plan to the State regulatory authority.

Operator Contact and System Information — Operator Information:

Name of Operator (legal entity):	
,MSA Operator ID(s) Included in this Inspection:	
Type of Operator:	☐Investor Owned ☐Municipal ☐Private ☐LPG ☐Other (e.g. cooperative)
States(s) included in this inspection:	
Headquarters Address:	
Company Contact:	
Phone Number:	
Email:	
Date(s) of Inspection:	Click here to enter a date. **TO** Click here to enter a date.
Date of Report:	Click here to enter a date.

Persons Interviewed:

Persons Interviewed *(List the DIMP Administrator as the first contact)*	**Title**	**Phone Number**	**Email**

State or Federal Representatives:

Inspector Name & Agency	**Phone Number**	**Email**

Inspector Comments (optional):

192.1005 What must a gas distribution operator do to implement this subpart?

Question No.	Rule §192	Description	S/Y	U/N	N/A	N/C
1	.1005	Was the plan written and implemented per the requirement of 192.1005 by 08/02/2011? <u>OR</u> For a gas system put into service or acquired after 08/02/2011, was a plan written and implemented prior to beginning of operation?	☐	☐	☐	☐
Inspector's Comments						
2	Information Only	Were commercially available product(s)/templates used in the development of the operator's written integrity management plan?	☐	☐	☐	☐
		Fully ☐ Partially ☐ Not at all ☐				
		Commercial product(s)/templates name if used:				
Inspector's Comments						
3	Information Only	Does the operator's plan assign responsibility, including titles and positions, of those accountable for developing and implementing required actions?	☐	☐	☐	☐
Inspector's Comments						
4	.1007(a)(1)	Do the written procedures identify or reference the appropriate sources used to determine the following characteristics necessary to assess the threats and risks to the integrity of the pipeline:				
		• Design (e.g. type of construction, inserted pipe, rehabilitated pipe method, materials, sizes, dates of installation, mains and services, etc.)?	☐	☐	☐	☐
		• Operating Conditions (e.g. pressure, gas quality, etc.)?	☐	☐	☐	☐
		• Operating Environmental Factors (e.g. corrosive soil conditions, frost heave, land subsidence, landslides, washouts, snow damage, external heat sources, business districts, wall-to-wall paving, population density, difficult to evacuate facilities, valve placement, etc.)?	☐	☐	☐	☐
Inspector's Comments						

192.1007(a) Knowledge of the System

Question No.	Rule §192	Description	S/Y	U/N	N/A	N/C
5	.1007(a)(2)	Do the written procedures require the consideration of information gained from past design, operations, and maintenance (e.g. O&M activities, field surveys, One-Call system information, excavation damage, etc.)?	☐	☐	☐	☐
Inspector's Comments						
6	Information Only	Do the written procedures indicate if the information was obtained from electronic records, paper records, or subject matter expert knowledge (select all which apply)? Electronic ☐ Paper ☐ SME ☐				
Inspector's Comments						
7	.1007(a)(3)	Does the plan contain written procedures to identify additional information that is needed to fill gaps due to missing, inaccurate, or incomplete records?	☐	☐	☐	☐
Inspector's Comments						
8	.1007(a)(3)	Does the plan list the additional information needed to fill gaps due to missing, inaccurate, or incomplete records?	☐	☐	☐	☐
Inspector's Comments						
9	.1007(a)(3)	Do the written procedures specify the means to collect the additional information needed to fill gaps due to missing, inaccurate, or incomplete records (e.g., O&M activities, field surveys, One-Call System, etc.)?	☐	☐	☐	☐
Inspector's Comments						
10	.1007(a)(5)	Do the written procedures require the capture and retention of data on any new pipeline installed?	☐	☐	☐	☐
Inspector's Comments						
11	.1007(a)(5)	Does the data required for capture and retention include, at a minimum, the location where the new pipeline is installed and the material from which it is constructed?	☐	☐	☐	☐
Inspector's Comments						
12	.1007(a)	Does the documentation provided by the operator demonstrate implementation of the element "Knowledge of the System"?	☐	☐	☐	☐
Inspector's Comments						
13	.1007(a)	Has the operator demonstrated an understanding of its system?	☐	☐	☐	☐
Inspector's Comments						

192.1007(b) Identify Threats

Question No.	Rule §192	Description	S/Y	U/N	N/A	N/C
14	.1007(b)	In identifying threats, do the written procedures include consideration of the following categories of threats to each gas distribution pipeline? • Corrosion • Natural Forces • Excavation Damage • Other Outside Force Damage • Material or Welds • Equipment Failure • Incorrect Operation • Other Concerns	☐☐☐☐☐☐☐☐	☐☐☐☐☐☐☐☐	☐☐☐☐☐☐☐☐	☐☐☐☐☐☐☐☐
Inspector's Comments						
15	.1007(b)	Did the operator consider the information that was reasonably available to identify existing and potential threats?	☐	☐	☐	☐
Inspector's Comments						
16	Information Only	Does the plan subdivide the primary threats into subcategories to identify existing and potential threats?	☐	☐	☐	☐
Inspector's Comments						
17	.1007(b)	In identifying threats did the information considered include any of the following? • Incident and leak history ☐ yes ☐ no • Corrosion control records ☐ yes ☐ no • Continuing surveillance records ☐ yes ☐ no • Patrolling records ☐ yes ☐ no • Maintenance history ☐ yes ☐ no • Excavation damage experience ☐ yes ☐ no • Other – Describe ____________ ☐ yes ☐ no	☐	☐	☐	☐
Inspector's Comments						
18	Information Only	Does the plan categorize primary threats as either "system-wide" or "localized"?				
		All System-wide ☐ / All Localized ☐ / Some of Both ☐ / Not Identified ☐				
Inspector's Comments						
19	Information Only	Do the written procedures consider, in addition to the operator's own information, data from external sources (e.g. trade associations, government agencies, or other system operators, etc.) to assist in identifying potential threats?	☐	☐	☐	☐
Inspector's Comments						
20	.1007(b)	Does the documentation provided by the operator demonstrate implementation of the element "Identify Threats"?	☐	☐	☐	☐
Inspector's Comments						

192.1007(c) Evaluate and Rank Risk

Question No.	Rule §192	Description	S/Y	U/N	N/A	N/C
21	Information Only	Was the risk evaluation developed fully or in part using a commercially available tool? Fully ☐ Partially ☐ Not at all ☐ Commercial tool name if used:				
Inspector's Comments						
22	.1007 (c)	Do the written procedures contain the method used to determine the relative importance of each threat and estimate and rank the risks posed? Briefly describe the method.	☐	☐	☐	☐
Inspector's Comments						

		For questions 23 – 25, do the written procedures to evaluate and rank risk consider:	Corrosion	Natural Forces	Excavation Damage	Other outside Force Damage	Material or Welds	Equipment Failure	Incorrect Operation	Other Concerns
23	.1007 (c)	Each applicable current and potential threat?								
24		The likelihood of failure associated with each threat?								
25		The potential consequence of such a failure?								
		Mark each box above with one of the following: S for "Satisfactory", U for "Unsatisfactory", N/A for "Not Applicable" and N/C for "Not Checked".								
Inspector's Comments										

26	.1007 (c)	If subdivision of system occurs, does the plan subdivide the system into regions with similar characteristics and for which similar actions are likely to be effective in reducing risk? Briefly describe the approach.	☐	☐	☐	☐
Inspector's Comments						
27	Information Only	Is the method used to evaluate and rank risks reasonable?	☐	☐	☐	☐
Inspector's Comments						
28	.1007(c)	Are the results of the risk ranking supported by the risk evaluation model/method?	☐	☐	☐	☐
Inspector's Comments						
29	.1007(c)	Did the operator validate the results generated by the risk evaluation model/method? Briefly describe.	☐	☐	☐	☐
Inspector's Comments						
30	.1007(c)	Does the documentation provided by the operator demonstrate implementation of the element "Evaluate and Rank Risk"?	☐	☐	☐	☐
Inspector's Comments						

192.1007 (d) Identify and implement measures to address risks

Question No.	Rule §192	Description	S/Y	U/N	N/A	N/C
31	.1007 (d)	Does the plan include procedures to identify when measures, beyond minimum code requirements specified outside of Part 192 Subpart P, are required to reduce risk?	☐	☐	☐	☐
Inspector's Comments						
32	.1007 (d)	When measures, beyond minimum code requirements specified outside of Part 192 Subpart P, are required to reduce risk, does the plan identify the measures selected, how they will be implemented, and the risks they are addressing?	☐	☐	☐	☐
Inspector's Comments						
33	.1007 (d)	Complete the table at the end of this form: *Threat Addressed, Measure to Reduce Risk, and Performance Measure*				
Inspector's Comments						
34	.1007 (d)	Does the plan include an effective leak management program (unless all leaks are repaired when found) 1. Locate the leaks in the distribution system; ☐ 2. Evaluate the actual or potential hazards associated with these leaks; ☐ 3. Act appropriately to mitigate these hazards; ☐ 4. Keep records; and ☐ 5. Self-assess to determine if additional actions are necessary to keep people and property safe. ☐	☐	☐	☐	☐
Inspector's Comments						
35	.1007(d)	Does the documentation provided by the operator demonstrate implementation of the measures, required by Part 192 Subpart P, to reduce risk?	☐	☐	☐	☐
Inspector's Comments						

192.1007(e) Measure performance, monitor results, and evaluate effectiveness

Question No.	Rule §192	Description	S/Y	U/N	N/A	N/C

	.1007(e)	i) Number of hazardous leaks either eliminated or repaired, categorized by cause?	ii) Number of excavation damages?	iii) Number of excavation tickets received by gas department ?	iv) Total number of leaks either eliminated or repaired categorized by cause?	v) Number of hazardous leaks either eliminated or repaired, categorized by material?	vi) Any additional measures the operator determines are needed to evaluate the effectiveness of the IM program in controlling each identified threat?
36	Does the plan contain written procedures for how the operator established a baseline for each performance measure?	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.
37	Does the plan establish a baseline for each performance measure?	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.
38	Does the operator have written procedures to collect the data for each performance measure?	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.
39	Do the written procedures require the operator to monitor each performance measure?	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.

Mark each box above with one of the following: S for "Satisfactory", U for "Unsatisfactory", N/A for "Not Applicable" and N/C for "Not Checked".

Inspector's Comments						
40	.1007 (e)	When measures are required to reduce risk, do the written procedures provide how their effectiveness will be measured?	☐	☐	☐	☐
Inspector's Comments						
41	Information Only	Can the performance measures identified by the operator in the plan be counted, monitored, and supported?	☐	☐	☐	☐
Inspector's Comments						
42	.1007(e)	Does the documentation provided by the operator demonstrate implementation of the element "Measure Performance, Monitor Results, and Evaluate Effectiveness"?	☐	☐	☐	☐
Inspector's Comments						

192.1007(f)Periodic Evaluation and Improvement

Question No.	Rule §192	Description	S/Y	U/N	N/A	N/C
43	.1007 (f)	Do the written procedures for periodic review include: a. Frequency of review based on the complexity of the system and changes in factors affecting the risk of failure, not to exceed 5 years? b. Verification of general information (e.g. contact information, form names, action schedules, etc.)? c. Incorporate new system information? d. Re-evaluation of threats and risk? e. Review the frequency of the measures to reduce risk? f. Review the effectiveness of the measures to reduce risk? g. Modify the measures to reduce risk and refine/improve as needed (i.e. add new, modify existing, or eliminate if no longer needed)? h. Review performance measures, their effectiveness, and if they are not appropriate, refine/improve them?	☐	☐	☐	☐
Inspector's Comments						
44	Information Only	Does the plan contain a process for informing the appropriate operating personnel of an update to the plan?	☐	☐	☐	☐
Inspector's Comments						
45	Information Only	Does the plan contain a process for informing the appropriate regulatory agency of a significant update to the plan?	☐	☐	☐	☐
Inspector's Comments						
46	.1007(f)	Does the documentation provided by the operator demonstrate implementation of the element "Periodic Evaluation and Improvement"?	☐	☐	☐	☐
Inspector Comments						

192.1007(g) Report results

Question No.	Rule §192	Description	S/Y	U/N	N/A	N/C
47	.1007(g)	Does the plan contain or reference procedures for reporting, on an annual basis, the four measures listed in 192.1007(e)(1)(i) through (e)(1)(iv) to PHMSA as part of the annual report required by § 191.11 and the State regulatory authority?	☐	☐	☐	☐
Inspector's Comments						
48	Information Only	When required by the State, does the plan identify the specific report form, date, and location where it is to be submitted?	☐	☐	☐	☐
Inspector's Comments						
49	.1007(g)	Has the operator submitted the required reports?	☐	☐	☐	☐
Inspector's Comments						

192.1009 What must an operator report when mechanical fittings fail?

Question No.	Rule §192	Description	S/Y	U/N	N/A	N/C
50	.1009	Does the operator have written procedures to collect the information necessary to comply with the reporting requirements of 192.1009?	☐	☐	☐	☐
Inspector's Comments						

192.1011 What records must an operator keep?

Question No.	Rule §192	Description	S/Y	U/N	N/A	N/C
51	.1011	Does the operator have written procedures specifying which records demonstrating compliance with Subpart P will be maintained for at least 10 years?	☐	☐	☐	☐
Inspector's Comments						
52	.1011	Does the operator have written procedures specifying that copies of superseded integrity management plans will be maintained for at least 10 years?	☐	☐	☐	☐
Inspector's Comments						
53	.1011	Has the operator maintained the required records?	☐	☐	☐	☐
Inspector's Comments						

Table 1: Threat Addressed, Measure to Reduce Risk, and Performance Measure

For the top five highest ranked risks from the operator's risk ranking list the following:

- Primary threat category (corrosion, natural forces, excavation damage, other outside force damage, material or weld, equipment failure, incorrect operation, and other concerns);
- Threat subcategory (GPTC threat subcategories are acceptable. Try to be specific. Example, failing bonnet bolts of gate valve, manufacturer name, model #);
- Measure to reduce the risk (list the one measure the operator feels is most important to reducing the risk);
- Associated performance measure.

	Primary Threat Category	Threat Subcategory, as appropriate	Measure to Reduce Risk	Performance Measure
1				
2				
3				
4				
5				

Other Inspector Comments	