Natural Gas Piping System Program

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1. PURPOSE

To document the standards, codes, regulations, and best management practices that are to be used in the design, installation, operation, repair, and inspection of natural gas piping systems.

2. SCOPE

This program covers natural gas piping from the Point of Delivery to the equipment and appliances, but does not include the following:

- Equipment or appliances using natural gas.
- Piping systems containing flammable gas-air mixtures (5% to 15% natural gas by volume), or gas-air mixtures outside the flammable range.

The Natural Gas Piping Systems Program applies to Mosaic owned natural gas piping systems located within Mosaic's New Wales facility. The Program does not include natural gas control systems, metering systems or process equipment.

3. DEFINITIONS

3.1 API – American Petroleum Institute

3.2 Approved - Acceptable to the Authority Having Jurisdiction.

3.3 Authority Having Jurisdiction - An organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving the equipment, materials, an installation, or procedure.

3.4 Electrical Bonding - An intentionally installed electrically conductive and continuous path from the gas piping to an effective ground-fault current path.

3.5 NACE - National Association of Corrosion Engineers.

3.6 ANSI - American National Standards Institute.

3.7 ASME - American Society of Mechanical Engineers.

3.8 NFGC - National Fuel Gas Code.

3.9 NFPA - National Fire Protection Association.

3.10 Listed - Equipment, material, or services included in a list published by an organization whose listing states that the item meets appropriate designated standards or has been tested and found suitable for a specific purpose.

3.11 Lower Explosive Limit (LEL) - That concentration of a combustible material in air below which ignition will not occur. Concentrations lower than LEL are "too lean" to burn.

3.12 Non-sparking Tools - Tools made of non-steel materials. Commonly thought to not generate a spark when being used, but which in fact generate a “cold” spark with very little heat content not capable of igniting a fire. Better described as reduced-sparking tools.

3.13 Point of Delivery - Shall be the outlet of the gas company service meter assembly or the outlet of the service regulator or shutoff valve where no meter exists.

3.14 Qualified Agency - Any individual, firm, corporation, or company that either in person or through a representative: 1) is engaged in and responsible for installation, replacement or testing of natural gas piping; 2) the connection, installation, testing, repair or servicing of appliances or equipment; 3) is experienced in such work; and 4) has complied with all regulatory requirements.

3.15 Readily Accessible - Having direct access without the need for removing or moving any panel, door, or similar covering of the item described.

4. GENERAL

4.1 At each facility where natural gas piping systems are present a person shall be designated by the site manager to provide oversight of the entire natural gas piping systems located at that facility.

4.2 Natural gas piping systems and equipment where the operating pressure is below 125 psi shall be installed, operated, and maintained in accordance with NFPA 54 “National Fuel Gas Code” (NFGC) and ASME B31.3 Process Piping and API 570 Piping Inspection Code.

4.3 Activities that are exceptions to the NFGC that may be applicable to Mosaic’s facilities are:

4.3.1 Natural gas used as a raw material (feedstock) except for piping to special atmosphere generators; and

4.3.2 Oxygen-fuel gas cutting and welding systems.

4.4 The provisions of the current NFGC (NFPA 54 - 2009) shall not be applied retroactively to existing systems that were in compliance with the NFGC in effect at the time of installation except:

4.4.1 If the equipment or piping is changed or modified; or

4.4.2 A state, county, city or other government body requires retroactivity.

4.5 The NFGC is not intended to prevent the use of standard engineering methods material, method of construction, or installation not prescribed in the Code provided that any such alternative is acceptable to the Authority Having Jurisdiction.

4.6 Installation, testing, and replacement of gas piping, appliances, or accessories and repair and servicing of equipment shall be performed only by a Qualified Agency. In Florida this includes certified and licensed plumbers, mechanical contractors, and general contractors.

5. OPERATIONS

5.1 Normal operations:

5.1.1 Only trained personnel shall operate and maintain the natural gas piping system and equipment using natural gas.

5.1.2 Smoking, open flames or hot work are prohibited when working in the vicinity of natural gas piping or equipment within each facility unless the area atmosphere has been tested and found to be less than 10% LEL, or the piping and equipment have been purged and determined to not contain natural gas.

5.1.3 When manually lighting natural gas, use face protection (face mask), flame retardant clothing and leather gloves to protect against burns.

5.1.4 Each area using natural gas for drying or in kilns will have written procedures for lighting gas equipment.

5.1.5 Procedures for non-routine operations, i.e. emergencies such as a leak, are to be incorporated into the operating procedures for each area.

5.2 Maintenance:

5.2.1 When preparing to perform work on piping that contains or has contained natural gas, the following shall apply :

a. Piping shall be purged before cutting or welding with a torch is attempted (see purging requirements below in this program).

b. Provisions for electrical continuity (Electrical Bonding) shall be made and implemented.

c. A metallic electrical bond shall be installed around open cuts in piping where the cut is made by other than cutting torches.

d. Smoking, open flames, and any hot work shall not be permitted if the piping has not been purged.

e. Artificial illumination shall be restricted to intrinsically safe flashlights and lamps.

f. The piping will be retested with an atmosphere testing instrument as part of issuing the Safe Work Permit.

5.2.2 Each outlet, including a valve, shall be closed and capped when equipment is not connected. (Exception: Laboratory equipment, such as a Bunsen burner, are exempted; and Listed quick-disconnect devices with integral shut-off or Listed gas convenience devices shall be permitted and may go uncapped.)

5.2.3 When preparing for entry into a confined space that has piping connected that contains or has contained natural gas, the piping shall be secured with a blind or blank flange or a double block and bleed.

5.2.4 Liquid that may have formed in existing gas piping shall be handled so as to avoid spillage or ignition.

5.2.5 When a flanged joint is opened, the gasket shall be replaced (even if it appears to be in good condition).

5.2.6 Purging of natural gas pipelines shall be performed anytime a modification or repair is to be made to the piping system, or a piping system contains air and gas is to be purged.

a. To protect the capacity of the plant air supply, the plant air system will not be used for any purging of natural gas or inert gases from natural gas piping systems.

5.2.7 Prior to acceptance and initial operation, all natural gas piping installations shall be tested and pressure tested.

5.2.8 Lubricated plug valves, if installed in the natural gas piping system, must be tested and inspected at least annually, and serviced with the proper sealant.

5.3 Leaks

5.3.1 Leak recognition:

a. Smell - Natural gas is colorless and odorless. A distinctive, pungent odorizer (mercaptan), similar to rotten eggs, has been added to the gas purchased by Mosaic to enable personnel to recognize the presence of gas quickly. (Note - Offsite, not all transmission lines are odorized.)

b. Sight - A white “dust” cloud, mist, or fog may be seen. Bubbles in standing water, or vegetation that appears to be dead or dying for no apparent reason, near distribution pipelines. A slight mist of ice or frozen area on the pipeline valve.

c. Sound - Unusual noise like roaring, hissing or whistling.

d. Travel - Personnel must be aware that natural gas, being lighter than air, may travel significant distances to a point of ignition and then flash back to the gas source (leak).

5.3.2 Leak response:

a. Move to a safe location; walk crosswind.

b. Notify personnel in the area of the situation; instruct them to move away from the gas leak.

c. Contact your supervisor or the New Wales guard gate (Nextel code red or blue) immediately.

i. Do not assume someone else will report the condition.

ii. Provide the exact location and other pertinent information.

d. Do not smoke, use any open flames, or operate electrical switches or breakers.

e. If possible turn off any machinery, equipment and pilot lights. If a vapor cloud has surrounded a piece of equipment, DO NOT go into the cloud to turn it off.

f. Barricade the affected area to prevent unauthorized entry. Stop all work activity and traffic flow in the affected area.

g. The facility’s Emergency Response Team will assume command for the emergency situation, secure the leak and notify Central Florida Gas.

5.4 Emergency Response

5.4.1 Response to any emergency or incident involving the natural gas systems shall be conducted according to the Emergency Action Plan for that facility.

5.5 PPE

5.5.1 The following PPE will be worn or used when working around natural gas piping and equipment:

a. Mosaic basic requirements: safety shoes, safety glasses, hard hat, hearing protection;

b. Leather gloves (cloth gloves may create static electricity);

c. If manually lighting natural gas equipment:

i. Face shield;

ii. Fire retardant jacket.

5.5.2 Gas meter capable of measuring LEL.

5.6 Tools

5.6.1 Non-sparking Tools will be used in any environment where ignition sources are a concern. When the presence of natural gas is expected or possible in or around the piping or work area and may exceed 10% LEL, then Non-sparking Tools will be required.

5.6.2 A survey of the work to be done requiring hand tools or other intrinsically safe tools should be completed to determine if any sparks can be generated by:

a. Ignition by friction; or

b. Ignition by a chemically-generated spark caused by impact between certain metals and some oxygen containing substances (such as rust).

5.6.3 Non-sparking Tools should:

a. Be kept clean and free from ferrous or other contaminants which may hamper the non-sparking properties.

b. Not be used in direct contact with acetylene, which may form explosive acetylides especially in the presence of moisture. (Copper acetylide is a heat and shock sensitive high explosive.)

c. Not be used with additional torque applied through the use of "cheater bars", since they generally have a lower tensile strength and lower toughness than steel tools.

5.6.4 Non-sparking Tools are NOT classified as anti-static since they do conduct electricity.

5.6.5 Materials of fabrication

a. Non-sparking Tools shall be made of materials such as: brass, bronze, copper-nickel, copper-aluminum, copper beryllium, and titanium alloys.

b. Non-metals like wood, leather, and plastic are suitable for some tools, such as shovels, scrapers, scoops, etc., and do not pose a friction spark hazard.

c. Fiberglass handles are recommended since they do not retain moisture as do wood handles, and fail progressively rather than catastrophically.

5.6.6 Tool maintenance

a. Non-sparking Tools should be stored separate from other tools used for routine work, and should be carried to the work site in a non-sparking tool bag or container.

b. The accepted standards of safety and maintenance for common steel hand tools must also be adopted with Non-Sparking Tools, in addition to any specific recommendations resulting for the alloys used.

c. Follow normal safety procedures when sharpening or redressing Non-sparking Tools.

6. IDENTIFICATION OF PIPING SYSTEMS

6.1 All above ground piping systems containing explosive or flammable materials:

6.1.1 Shall be painted with yellow background and identified as “NATURAL GAS” in black letters sized per Table No. 1 below and as specified in ANSI Z13.1, American National Standard for Safety Colors.

a. Arrows shall be used to indicate direction of flow.

b. Identification of pipes less than ¾ inch in diameter, and for valve and fitting identification, permanently legible tags may be used.

Table No. 1 Identification of Natural Gas Piping Systems		
Pipe Diameter - Outside (inches)	Length of Color Field (inches)	Letter Size (inches)
¾ " to 1 ¼"	8	½"
1 ½ " to 2"	8	¾"
2 ½" to 6"	12	1 ¼"
8" to 10"	24	2 ½"
Over 10"	32	3 ½"

6.2 All above ground piping system identification shall be applied close to valves, flanges and adjacent to changes in piping direction, branches, where pipes pass through walls or floors, and at intervals on straight pipe runs sufficient for identification.

6.3 Piping identification can be accomplished by signs, markers, stenciling or other appropriate means and shall be visible from normal sight locations.

7. INSTALLATION

7.1 Piping installed above ground shall be securely supported and located where it will be protected from physical damage. .

7.2 Piping installed underground shall be installed with sufficient clearance from other structures, protected from damage (settling ground, vehicular traffic, etc.), and protected from corrosion in an approved manner.

7.3 For piping systems located inside buildings the maximum design operating pressure shall not exceed 5 psi unless the piping is:

7.3.1 Welded.

7.3.2 Enclosed for protection against gas accumulation, such as a ventilated chase.

7.3.3 Located in buildings or separate areas used for one of the following: industrial processing or heating; research; warehousing; and boiler or mechanical rooms.

7.3.4 A temporary installation for buildings under construction.

7.4 Materials for piping systems and joining methods shall comply with Table 5.6 - Acceptable Piping Materials and Joining methods in chapter 5 of NFPA 54 - 2009, or the Mosaic Equity Engineering Practice EP 5-2-1, or shall be acceptable to the Authority Having Jurisdiction.

7.5 Backflow shall be prevented whenever a supplementary gas for standby use is connected downstream from a meter of service regulator. A three-way valve shall be permitted to be used for this purpose.

7.6 Meters and pressure regulators shall be located in ventilated spaces that are Readily Accessible, and shall not be placed where they will be subjected to damage.

7.6.1 Gas meters shall not be placed where they will be exposed to extreme temperatures.

7.6.2 Pressure regulators, if installed inside a building, shall be provided with an independent vent to the exterior of the building.

7.6.3 Meters and regulators shall be marked by a permanent means designating the building, or area in a building, being supplied.

7.7 Any essential control system depending on electric current as the operating medium shall be of a type the shuts off (fail safe) when there is a power failure.

7.8 Overpressure protection

7.8.1 Pressure relief devices shall be installed where it is necessary to protect the piping system, equipment or appliances. Specific requirements that address the requirement, and an exemption condition, are included in the NFGC, NFPA 54 - 2009, section 5.9.

7.8.2 The discharge from any pressure relieving or pressure limiting device shall be vented outdoors, away from personnel and sources of ignition, and located so that the discharge does not re-enter any buildings.

7.8.3 Pressure regulating, limiting and relieving devices shall be properly maintained, inspection procedures shall be prepared or suitable instrumentation installed to detect failures. Repairs or replacements shall be promptly made. .

7.9 Back pressure protection

7.9.1 Where the design of equipment connected is such that air, oxygen, or standby gases could be forced into the natural gas supply system, protective devices shall be installed as close to the equipment as possible.

7.9.2 Protective devices include but are not limited to: check valves, three way valves, reverse flow indicators controlling positive shutoff valves, and normally closed air-actuated positive shutoff pressure regulators.

7.10 Shutoff valves shall be Approved; shutoff valves 1 inch NPT and smaller shall be Listed.

7.11 Excess flow valves, if installed, shall be Listed and shall be sized and installed in accordance with the manufacturer's instruction.

7.12 Piping systems shall be designed to have sufficient flexibility to prevent thermal expansion or contraction from causing excessive stresses in the piping material.

7.13 For other than dry gas conditions, a drip shall be provided at any point in the line of pipe where condensate could occur. Drips shall be located where they are Readily Accessible. .

7.14 Concealed piping in buildings:

7.14.1 Connections shall be of the type such as elbows, tees, and couplings; tubing may be joined by brazing.

7.14.2 Concealed gas piping shall not be located in solid partitions.

7.14.3 Tubing installed in partitions shall be protected with a steel striker barrier.

7.15 Piping installed in solid floors of industrial buildings shall be laid in channels in the floor and covered to permit access.

7.16 Manual shutoff valves

7.16.1 An accessible gas shutoff valve shall be provided upstream of each pressure regulator.

7.16.2 Main gas shutoff valves shall be Readily Accessible and installed so as to be protected from physical damage.

7.17 Emergency shutoff valves:

7.17.1 An exterior shutoff valve to permit turning off the gas supply in an emergency shall be provided.

7.17.2 If the piping branches to multiple buildings, an emergency valve shall be provided for each building.

7.17.3 The emergency shutoff valves shall be plainly marked as such and their locations posted.

7.17.4 The shutoff valve can also serve as the emergency shutoff valve.

7.18 Laboratories containing two or more gas outlets shall have a single accessible shutoff valve for all gas outlets.

8. ELECTRICAL BONDING

8.1 Each aboveground portion of a gas piping system (other than corrugated stainless steel tubing - CSST) that is likely to become energized shall be Electrically Bonded.

8.2 CSST gas piping systems shall be grounded to the grounding system where the gas service enters the building.

8.3 Electrical bonding jumper straps shall be applied during all gas service disconnects.

8.4 Metal pipe and joints that are threaded (including those using joint compounds), flanged, welded and brazed are considered to provide an electrically continuous connection and do not require bonding jumpers unless disconnected.

8.5 Natural gas piping shall not be used as a grounding conductor or electrode.

8.6 Where a lighting protection system is installed, the Electrical Bonding of the gas piping shall be in accordance with NFPA 780 - Standard for Installation of Lighting Protection Systems.

9. CATHODIC PROTECTION

9.1 Piping in contact with earth or other material that could corrode the piping shall be protected against corrosion in an approved manner. Steel, cast iron, ductile iron, and other piping materials susceptible to external corrosion shall be provided with cathodic protection regardless of coatings used. .

9.2 Cathodic systems shall be installed, operated, maintained and tested in accordance with NACE Standard RP 0169.

10. ABANDONED NATURAL GAS PIPING

10.1 All natural gas piping systems that have no future planned usage will be decommissioned by rendering the contents harmless, physically disconnecting or removing the piping, and noting such on the appropriate engineering documentation.

11. TESTING, INSPECTION, LEAK CHECKS - NEW & MODIFIED PIPING

11.1 Prior to acceptance and initial operation, all natural gas piping gas installations shall be inspected and tested in accordance with ASME B31.3 and Mosaic Equity Engineering Practice EP 5-5-3.

11.1.1 Where repairs or additions are made following the pressure test, the affected piping shall be tested.

11.1.2 Minor repairs and additions are not required to be pressure tested provided the work is inspected and leak checked by an appropriate leak detecting method.

11.1.3 New branches shall be required to be pressure tested.

11.1.4 Full volumetric inspection may be used in lieu of pressure testing per ASME B31.3 and Mosaic Equity Engineering Practice EP 5-5-3 with approval from the Mechanical Integrity department.

11.2 The pressure testing medium shall be air, nitrogen, carbon dioxide, water, or an inert gas. WARNING: **Oxygen shall NEVER be used**.

11.3 In no case shall a valve be used as a bulkhead between gas in one section and the test medium in the adjacent section, unless a double-block-and -bleed is installed between the sections.

11.4 Prefabricated pipe, valve and regulator assemblies and pressure tested at the time of assembly need not be retested, but must be leak tested after installation.

11.5 The testing pressure and procedure shall be in accordance with ASME B31.3 and Mosaic Equity Engineering Practice EP 5-5-3.

11.6 The piping system shall withstand the test pressure specified without showing any evidence of leakage or defects. Any reduction of test pressure shall be deemed to indicate the presence of a leak unless the reduction can be attributed to some other cause.

11.7 Immediately after starting gas to a new system or into a system that has been restored after an interruption of service, the piping shall be checked for leakage.

12. PURGING NATURAL GAS PIPELINES

12.1 Purging of natural gas pipelines shall be performed anytime:

- a modification or repair is to be made to the piping system, or

- a piping system contains both gas and air

12.2 **Piping Systems Required to be Purged Outdoors** (industrial, large commercial and large multifamily facilities): Purging of piping systems is required when the piping system meets either of the following:

12.2.1 The design operating gas pressure is greater than 2 psig, or

12.2.2 If the piping being purged contains one or more sections of pipe or tubing greater than 2 inches diameter and exceeds the length in Table 2.

Table2

Length of Piping Requiring Purging With Inert Gas for Servicing or Modification

Nominal Pipe Size (inches)	Length of Piping (feet)
2½	>50
3	>30
4	>15
6	>10
8 or larger	Any length

12.3 Removal from Service: Where existing gas piping is opened, the section that is opened shall be isolated from the gas supply and the line pressure vented in accordance with paragraph 11.5. Where gas piping, that meets the criteria of Table # 2, is removed from service, the residual fuel gas in the piping shall be displaced with an inert gas.

12.4 Placing in Operation: Before placing piping that contains air and meets the criteria in Table 2 into operation, the air shall be displaced with an inert gas. Next, the inert gas shall then be displaced with fuel gas in accordance with Table 2.

12.5 Outdoor Discharge of Purged Gases: The open end of a piping system being pressure vented or purged shall discharge directly to an outdoor location. Purging operations shall comply with all of the following requirements:

12.5.1 The point of discharge shall be controlled with a shutoff valve.

12.5.2 The point of discharge shall be located:

- at least 10 feet from sources of ignition
- at least 10 feet from building openings
- at least 25 feet from mechanical air intake openings

12.5.3 While discharging, the open point of discharge shall be continuously attended and monitored with a combustible gas indicator that complies with paragraph 11.5.

12.5.4 Purging operations introducing fuel gas shall be stopped when 90% fuel gas by volume is detected within the pipe.

12.5.5 Persons not involved in the purging operations shall be evacuated from all areas within 10 feet of the point of discharge.

12.6 Combustible Gas Indicator:

12.6.1 The combustible gas indicator used during purging operations shall be Listed and shall be calibrated in accordance with the manufacturer's instructions and recommended schedule.

12.6.2 The combustible gas indicator used for pipe discharge monitoring shall numerically display a volume scale from 0% to 100% with a resolution of not greater than 1% increments.

12.6.3 Combustible gas indicators are available with different scales. For purging, it is required to use the percent gas in air scale.

Note: The % LEL scale shall not be used as it is not relevant to purging.

12.7 **Piping Systems Allowed to Be Purged Indoors or Outdoors** (light commercial or smaller residential buildings): The purging of piping systems is required when the piping system meets both of the following:

12.7.1 The design operating pressure is 2 psig or less, and

12.7.2 The piping system being purged is constructed entirely from pipe or tubing of 2 inch nominal size or smaller, or larger pipe or tubing with lengths shorter than specified in Table 2.

12.8 Purging Procedure. The piping system shall be purged in accordance with one or more of the following:

12.8.1 The piping shall be purged with fuel gas and shall discharge to the outdoors.

12.8.2 The piping shall be purged with fuel gas and shall discharge to the indoors or outdoors through an appliance burner not located in a combustion chamber. The appliance burner shall be provided with a continuous source of ignition.

12.8.3 The piping shall be purged with fuel gas and shall discharge to the indoors or outdoors through a burner that has a continuous source of ignition and that is designed for such purpose.

12.8.4 The piping shall be purged with fuel gas that is discharged to the indoors or outdoors, and the point of discharge shall be monitored with a listed combustible gas detector in accordance with 11.7. Purging shall be stopped when fuel gas is detected.

12.8.5 The piping shall be purged by the gas supplier in accordance with written procedures.

12.9 Combustible Gas Detector:

12.9.1 The combustible gas detector used during purging operations shall be Listed and shall be calibrated or tested in accordance with the manufacturer's instructions and recommended schedule.

12.9.2 The combustible gas detector used for pipe discharge monitoring shall indicate the presence of fuel gas.

12.10 Purging Appliances and Equipment: After the piping system has been placed in operation, appliances and equipment shall be purged before being placed into operation.

12.11 A written and approved plan or protocol must be prepared that details the purging job steps, schedule, communications, safety considerations, and purging end points. The purging plan should contain at least the following elements and anticipated required equipment:

12.11.1 Written purge plan will be job specific:

a. Overall schedule;
b. Required approvals;
c. Named personnel responsible for supervising purging;
d. Notification, and relocation if necessary, of affected employees;
e. Calculation of quantity of inert or natural gas purge;
f. Estimated time required for purges to displace natural gas and displace air;
g. Specific steps for:
    i. Removing piping from service;
    ii. Depressurizing;
    iii. Securing pipe for purging;
    iv. Timed and measured purge, with an LEL check in the end of the purge hose;

v. Number of purge flushes (3X is generally accepted);
vi. Performing repairs / modifications / demolition preparations;
vii. Leak and pressure testing;
viii. Returning piping to service;
ix. Re-purging with natural gas, with a PID meter gas check;
x. Light-off.

h. Visual survey of pipe for difficult to purge sections -
   i. Additional bleed / sample points (may require hot taps);
i. End point determination - remove piping from service (refer to Table No. 2) -
   i. Inert gas purging end point (% LEL);
j. End point determination - return piping to service (refer to Table No. 3) -
   i. Natural gas purging end point (% O2 or % combustibles); or
   ii. Inert gas purge end point (% O2);
k. Venting location (shall be outdoors);
l. Continuous gas sampling locations;
m. Electrical bonding requirements - specific type location;
n. Pipeline leak and pressure testing - after repairs / modification;
o. Decision criteria on use of Non-sparking Tools;
p. Training / familiarization of all personnel purging operations;
q. Documentation forms;
r. Piping system “as-built” drawings.

12.11.2 Equipment list and preparations - potential equipment required:

a. Communications’ devices;
b. Two (2) gas meters with LEL indication, recently calibrated;
c. One six (6) foot long sensing tube for monitoring conditions at the actual discharge point;
d. One PID (photo ionization detector) meter for the gas re-introduction step (and possibly even the initial purge process). (Most LEL meters are not designed to be used in oxygen-deficient atmospheres.);
e. Pressure measuring - pressure gauge and/or manometer;
f. Hoses - purge gas and vent gas;
g. Fittings;
h. Purge and vent point assemblies;
i. Extra valves;
j. Non-sparking Tools;
k. Special lockout devices;
l. Pipe blanks and blinds;
m. Electrical jumpers;
n. Leak checking (electronic and / or liquid based);
o. Barricades;
p. Barricade safety tape;
q. Warning signs;

12.11.3 The purging plan may be in two parts - removing from service and returning to service - for ease in developing and use.

13. TRAINING

13.1 General workforce: Initial training should include at least: properties and hazards of natural gas, PPE, leak detection and leak response, and emergency response to a leak.

13.2 Operations personnel: Initial training should include at least: properties and hazards of natural gas, PPE, leak detection and leak response, emergency response to a leak, general familiarization with the natural gas piping system, operating natural gas piping system and equipment in their area.

13.3 Maintenance personnel: Training should include all elements of Operations training (except operating natural gas equipment), and topics specific to maintenance: (i.e. Non-sparking Tools, Electrical Bonding, and hot work around natural gas pipelines).

13.4 Purging Specific Training: All personnel conducting / participating in purging and performing mechanical work on natural gas pipeline systems shall:

13.4.1 Purging training will be conducted anytime purging of natural gas pipelines is to be performed.

13.4.2 Training should include at least: properties and hazards of natural gas, PPE, Electrical Bonding, safe venting practices (including barricading and warning signs), proper use of gas detectors, danger of relying on the use of sense of smell alone to detect presence of gas, working with an inert gas, and the approved procedure for the present job.

14. INSPECTIONS

14.1 Mechanical Integrity shall be responsible for determining methodology and frequency for inspection routine practices and tests as per API 570 - Piping Inspection Code

14.2 New and modified piping systems shall be inspected and tested in accordance with ASME B31.3 and Mosaic Equity Engineering Practice EP 5-5-3 prior to being placed in service.

14.3 Pressure regulating, limiting and relieving devices shall be properly maintained, inspection procedures shall be prepared or suitable instrumentation installed to detect failures..

14.4 Lubricated plug valves must be tested and inspected at least annually, and serviced with the proper sealant.

14.5 All periodic inspections will be generated by a computer based repetitive work order system.

15. DOCUMENTATION

15.1 Pressure testing of new and modified piping will be documented and the documentation retained for the life of the pipeline. The documentation will include: date of test, identification of piping system tested, test fluid, test pressure, certification of results by the examiner, examination procedures, and examination personnel qualifications.

16. CONTRACTORS

16.1 Contractors or vendors shall be responsible for knowing the regulations, standards, codes, and best management practices that apply to each location where work is performed.

17. REFERENCES

17.1 American Gas Association, “Purging Principles and Practice”, 3rd Edition, 2001

17.2 American National Standards Institute, ANSI Z535.1-2006, American National Standard for Safety Colors

17.3 American Petroleum Institute, API 570, “Piping Inspection Code: Inspection, Repair, Alteration, and Rerating of In-Service Piping Systems”

17.4 American Society of Mechanical Engineers, ASME A13.1-1998, “Scheme for the Identification of Piping Systems”`

17.5 National Fire Protection Association, NFPA 54-2009 / ANSI Z223.1, “National Fuel Gas Code”

17.6 National Fire Protection Association, NFPA 780 - Standard for Installation of Lightning Protection Systems

17.7 OSHA Publication No. 3080 (2002) - “Hand and Power Tools”

18. REVISION LOG

Revision Log				
Rev. No.	Requested By	Approved By	Revised By	Rev. Date
0	Initial Issue for Mosaic	Safety Dept.	Safety Dept.	5/14/07
1	Revise as per NFPA Natural Fuel Gas Code (NFPA 54-2009)		D. Allen - STC	7/30/2010
	Reformat for ISO		D. Allen	6/30/2011
2	Reformat for ISO		R. Withers	3/28/2012
3	Multipe Field Requests	Health & Safety	PMO	11/14/2023

Contact the Subject Matter Expert for additional information on this program.