REFERENCES:

Title 49 CFR 192.151, Tapping
Title 49 CFR 192.321, Installation of Plastic Pipe
Title 49 CFR 192.627, Tapping Pipelines Under Pressure
O&M Procedure II.2.IV, Prevention of Accidental Ignition

I. POLICY

A. It is the policy of this gas system to conduct its operations and maintenance activities in accordance with manufacturer recommendations and the requirements of the Department of Transportation.

B. Questions regarding application of this procedure should be directed to the Deputy Director of Gas and Lights.

II. GENERAL INFORMATION

A. Definitions

1. Plastic – As used in this procedure section specifically refers to polyethylene plastic materials for use as services, mains, or fittings intended for natural gas distribution. This designation specifically excludes Polyvinyl Chloride (PVC) pipe and fittings.

2. Squeeze-off – a method of controlling the pressure or flow through a plastic pipeline by reducing the cross sectional area of the pipe by external force.

3. Static electricity – the buildup of an electrical charge that can occur on any surface of the plastic pipe.

4. Static electricity liquid solution – a liquid with a relatively low surface tension that allows it to easily cover the area of exposed plastic pipe or to be easily absorbed by cloths or towels.
   a. A suitable static electricity solution is leak test soap.

B. When performing a squeeze-off on a plastic pipeline, the DPU's policy is to give prime consideration to public safety as well as to the safety of the personnel performing the operation. Strict adherence to DPU safety regulations must be observed.

C. All employees and contractors normally engaged in gas distribution operations and maintenance shall be qualified in proper squeeze-off and tapping procedures and the control of static electricity.

III. PROCEDURES

A. Squeeze-Off Tool Operation

1. Before using any squeeze tool, the operator must be familiar with its construction, operation, and design features. The pipe size and Standard Dimension Ratio (SDR) number must be identified. The proper squeeze tool for the pipe identified must be used. See Exhibit A for Squeeze-off tool specifications. Check the tool to assure that the tool has the proper squeeze bar configuration and that the tool will prevent over squeezing the pipe. The operator should assure that the tool is in good working order and operating in accordance with the manufacturer's instructions.

2. Manually operated squeeze tools should not be operated with pneumatic equipment.

3. The point of squeeze shall be located at least three diameters of pipe or 12", whichever is greater, away from the nearest:
   a. Fused joint
   b. Transition fitting (also, do not squeeze between the steel portion of the fitting and the first fused joint)
   c. Mechanical coupling
   d. Previous squeeze-off location.

4. Center the grounded squeeze tool, visually, over the grounded pipe and make initial contact with the pipe by a partial (10-15%) squeeze. Determine that the upper jaw is parallel, or level, with the lower jaw and an equal space exists on both sides of the pipe. If the upper jaw is sloped or tilted to one side, this indicates that centering is not proper and should be adjusted.

5. The grounded squeeze-off tool should be operated at a slow enough rate (2 inches per minute) to allow stress relaxation of the pipe to occur.

   Example: 4" IPS pipe has an outside diameter of approximately 4.5": It should take 2.25 minutes to squeeze-off the pipe.

   During cold weather extra time should be allowed for stress relaxation. Grounded pipe should be squeezed until flow of gas stops or the mechanical stop of the tool is contacted, whichever occurs first.

6. When the grounded pipe is to be released, the grounded squeeze tool should be removed in a slow controlled manner (0.5 inches per minute). Sudden release of mechanical or hydraulic pressure should be avoided.

   Example: 4" IPS pipe has an outside diameter of approximately 4.5": It should take 9 minutes to release the squeeze-off of the pipe.

B. Static Electricity Safety Precautions

1. Squeeze-off of plastic pipe may involve the possibility of and potential hazard of static electricity. The squeeze tool and pipe must be grounded for electricity before squeezing the pipe. See Procedure II.2.IV Prevention of Accidental Ignition, for more information.

2. Caution should be used when squeezing-off pipe. When the pipe is squeezed, the velocity of the gas is increased through the squeezed area. With the increase in velocity comes a possible increase in the amount of static electricity build-up on the pipe. Always ground the pipe and the squeeze tool before applying squeeze tool to the pipe.

3. If the gas main under repair is blowing gas, it is recommended that the squeeze-off be performed in a separate bell hole, remote from blowing gas, due to the potential of static electricity. The bell hole should be excavated approximately 25 feet, or more, away from the affected area.

4. After squeeze-offs have been completed and if a cut must be made, the area being cut and the tool being used--saw or polyethylene pipe cutter--must be grounded and the cut face must be wetted, and remain wetted with static electricity solution until the cut has been completed.

5. Immediately after the pipe piece has been cut out, spray the inside of each end of the remaining pipe in the ground to defuse any static electricity charges which may have built up.

6. All rags used for static electricity prevention must be kept wet and in place until repairs have been completed and the leak checked.

C. Distribution System Review

1. Review the distribution system that will be affected by the squeeze-off operation. This review may include the following items:
   a. Identification of other distribution piping in the area,
   b. Identification of other distribution feed/supply to the area,
   c. Location of valves,
   d. Number of customers downstream,
   e. Type of customers downstream.

2. The review may indicate that a bypass is required. If a bypass line is required to maintain supply to customers during a stop-off, the bypass line must be sized to support the load requirements. A typical bypass assembly is shown in Exhibit B

D. Written Job Procedure

1. If the squeeze-off operation has the potential to interrupt the gas supply to 20 or more customers downstream a written procedure shall be prepared and reviewed with all field personnel assigned to, or involved in the job, prior to the squeeze-off operation.

2. The written procedure should contain the following:
   a. Steps necessary to prepare for and conduct the operation.
   b. Other departments to be contacted including their phone numbers.
   c. The placement of gauge points.
   d. The location of personnel or departments to assist.
   e. Appropriate instructions requiring the reporting of leaks, pressure drops or outages to the procedure director.

3. Each written procedure should be reviewed by one other person who is qualified by training or experience to review these procedures.

4. A sample job procedure is shown in Exhibit C

E. Squeezing-Off Live Mains

1. A procedure director or other individual capable of authorizing and taking corrective action must be present on the site during the squeeze-off operation.

2. Dispatch should be alerted to the squeeze-off procedure being conducted in the field. Appropriate instructions requiring the reporting of leaks or outages to the procedure director may be required.

3. If the squeeze-off operation is on a system with a two-way feed, or the system downstream is supplied through a bypass, then a method of monitoring pressures on both sides of the squeeze-off must be established. Pressure gauges (for pressures in excess of 14" WC (water column)) or manometers (for pressures of 14" WC or less) must be used to indicate pressure. The following precautions are required:

   a. The location of the gauge points should be in proximity to the squeeze-off to allow continuous communication between the individuals monitoring the gauges and the procedure director.
   b. Assign one individual per gauge to continuously monitor the pressure on either side of the squeeze-off. The individuals shall have no other task to perform during the continuous monitoring of the gauge.
   c. During the period in which the pipe is being squeezed each monitor shall immediately alert the procedure director to any abrupt pressure changes. The squeezing off of the pipe shall stop and the procedure

director shall make the determination to proceed or abort the squeeze-off.

d. After the squeeze-off is complete, and prior to cutting the pipe, monitor the pressure gauges to establish the low pressure points. Observe gauges for a minimum of 30 minutes before continuing.

(1) At anytime during the monitoring should the pressure drop below the minimum specified in the procedure (normally 5 inches water column for low pressure systems), immediately release the squeeze-off tool. Other conditions, such as rapidly falling pressure or unanticipated fluctuations in pressure will also justify aborting the procedure by removing the squeeze-off tool. The procedure director shall be notified immediately.

4. Downstream pressures need not be monitored under the following conditions:
   a. Planned shutdowns,
   b. There are no customers downstream of the squeeze-off, or
   c. The main dead ends downstream of the squeeze-off operation.

F. Completion of the Squeeze-Off

1. Once the pressure has been released, the grounded squeeze tool, when practical, should be rotated 90° from its original position and squeezed to re-round the pipe. Apply only enough pressure to re-round the grounded pipe.

2. The squeezed-off area of the pipe should be examined, and marked by wrapping the pipe with a full encirclement clamp or permanent attachment. This practice will ensure that additional squeeze-offs, if needed, will not be performed in the same location.

G. Tapping Plastic Pipe

1. Each tap made on a pipeline under pressure shall be completed under the direction of an employee or contractor's employee who has been qualified to perform the tapping procedure.

2. Each mechanical fitting used to make a hot tap must be designed for at least the Maximum Allowable Operating Pressure (MAOP) of the pipeline.

3. All pressure testing should be completed prior to performing the tap.

4. All sources of ignition shall be removed from the work area before beginning the tapping operation and fire extinguishing equipment shall be placed in close proximity to the work area.

5. All tapping procedures should be in accordance with the tapping equipment manufacturer's recommended procedures. No-Blow fittings shall be operated with manufacturer recommended equipment or tools.

6. Plastic service tees should be heat fused or mechanically coupled to plastic mains to perform a service tap or main lateral. Manufacturer's specified temperatures and time periods for each pipe size and fitting should be adhered to when performing the heat fusion operation. These service tees contain a cutter which should be used to perforate the main.

7. When hot tapping a plastic insertion, two (2) circumferential cuts should be made on the casing approximately twelve (12") inches apart. Care must be taken to prevent cutting the inserted plastic pipe. The loose section of the casing should then be blocked up so that the inserted plastic pipe rests on the bottom of the casing. The loose section of casing can then be split, using a hammer and chisel or a circular saw, depending on the material.

IV. EXHIBITS

A. Squeeze-Off Tool Specifications
B. PE Pipe Bypass Connection Assembly Detail
C. Sample Job Procedure

Exhibit A

Squeeze-Off Tool Specifications

Squeeze-Off tools must meet the requirements of ASTM F1041.

Squeeze Bar Minimum Gaps by Pipe Size		
Pipe Size	Standard Dimension Ratio (SDR)	Minimum Gap Between Squeeze Bars (inches)
½" CTS	7	0.126
½" IPS	9.3	0.126
¾" IPS	11	0.133
1" CTS	11.5	0.137
1" IPS	11	0.167
1 ¼" IPS	10	0.232
1 ½" IPS	11	0.242
2" IPS	11	0.302
3" IPS	11.5	0.430
4" IPS	11.5	0.553
6" IPS	11.5	0.806
CTS = Copper Tube Size IPS = Iron Pipe Size		

Squeeze Bar Minimum Size by Pipe Size	
Pipe Size	Minimum Bar Size
½" – ¾"	1"
1" – 2"	1 ¼"
3" – 4"	1 ½"
6" – 8"	2"
10" – 12"	3"
14" – 16"	3 ½"

Exhibit B

PE Pipe Bypass Connection Assembly Detail

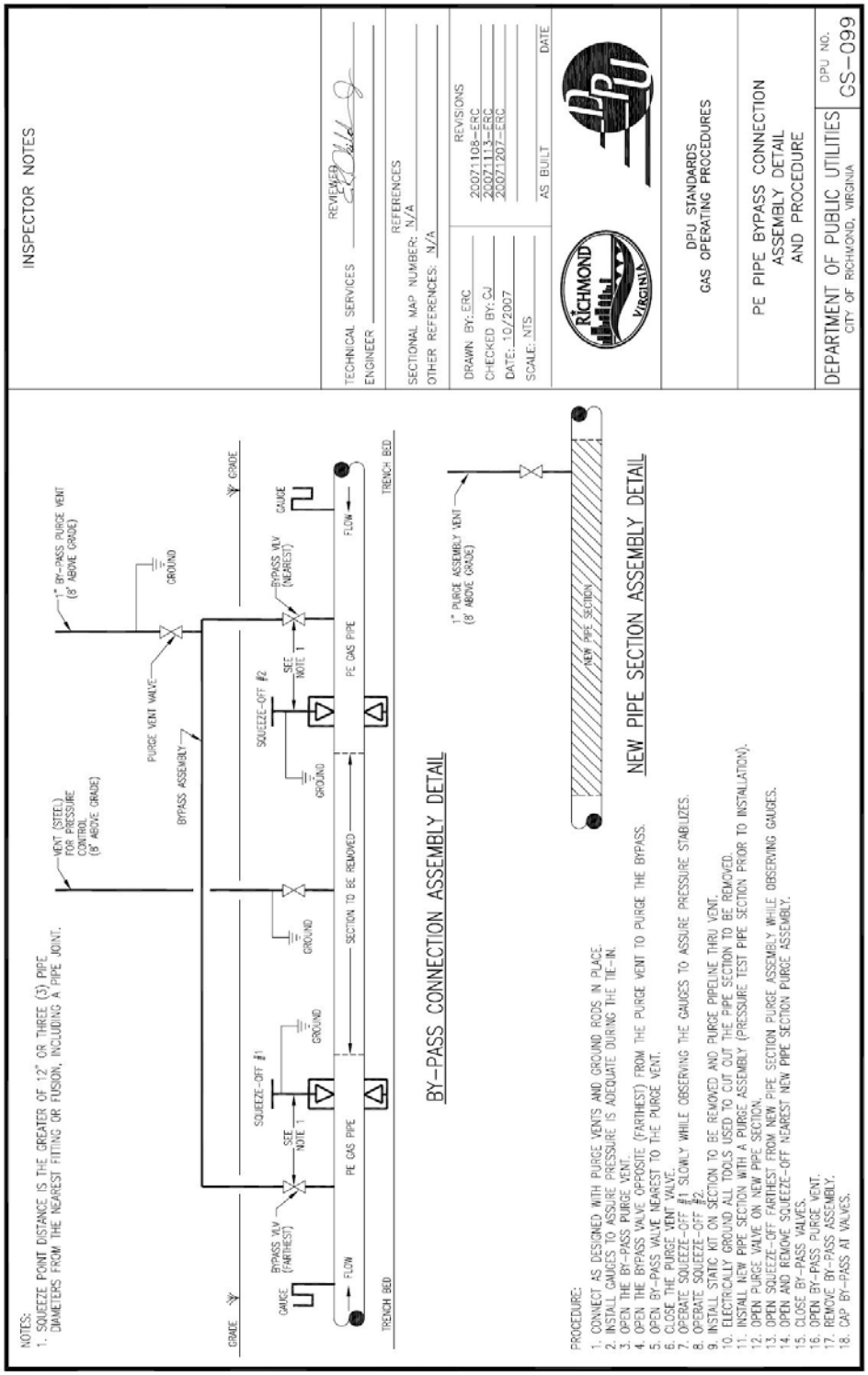

Exhibit C
Sample Job Procedure

Job Procedure

Work Order Number WO2007196	**Date:** 12/12/2007
Inspector Name: Mary Smith	
Contractor: Henkels & McCoy	**Foreman Name:** A. Jones
Job Description: Tie-in 1600 ft new 4" plastic main to existing 4" plastic main at the intersection of Main Street and Green Street. Purge the main and gas it up	
Map Number: SW174	**Normal Operating Pressure:** 30 psig
Review/Approved by:	**Date:**

See attached Sketch

Step #	Description	Completed By:	Time:
1	Verify valve at Main St and 4th St is open		
2	Verify valve at Main St and Prospect St is open		
3	Notify Dispatch of Tie-in operation and location		
4	Verify tees for gauge points are installed, tapped and gauges installed		
5	Verify purge point H is installed, tapped and capped		
6	Ensure Squeeze-off tools are grounded		
7	Squeeze-off plastic main at point A while continuously monitoring gauges at E and F WARNING: If pressure drops to or below 25 psig, STOP the procedure and remove the squeeze-off		
8	Monitor pressure at gauges E and F for 10 minutes, record the pressure every minute **Time** **Gauge E** **Gauge F** _____		

Exhibit B
Sample Job Procedure

Work Order Number WO2007196

Step #	Description	Completed By:	Time:
9	If the pressure is stable, Squeeze-off plastic main at point B while continuously monitoring gauges at E and F WARNING: If pressure drops to or below 25 psig, STOP the procedure and remove the squeeze-off		
10	Monitor pressure at gauges E and F for 10 minutes, record the pressure every minute **Time** **Gauge E** **Gauge F** _____		
11	If pressure is stable, Open Purge Pt H to relieve gas pressure – Verify no squeeze-off leakage		
12	Cut the existing main. Ensure Cutting tool is grounded.		
13	Tie-in the new main using fusion and mechanical fitting		
14	Verify fused joint is cool		
15	Verify Valve G is open		
16	Verify purge pt J at end of main is open		
17	Insert Nitrogen slug at Purge Pt H		
18	Close Valve G		
19	Release Squeeze-off at pt B and purge through Purge Point H until 95% - 100% gas		
20	Close Purge Pt H		
21	Open Valve G. purge to end of main through purge pt J until 95% - 100% gas		
22	Close purge pt J		
23	Release the squeeze-off at Pt A		
24	Close gauge pts E & F, remove gauges, cap gauge pts		
25	Cap the purge pts		
26	Notify Dispatch that tie-in is complete		

Exhibit B
Sample Job Procedure