OGA Technical Seminar
Excess Flow Valves/Small Commercial & Multiple Meter Applications

Jerry Taggart
Compliance Specialist
Columbia Gas

March 22, 2013
NiSource Gas Distribution

Columbia Gas of Ohio
- Largest Natural Gas Provider in Ohio
- 1.4 Million Customers
- 20,000+ Miles of Pipe

Columbia Gas of Kentucky
- 2nd Largest Gas-Only Provider in Kentucky
- 142,000 Customers
- 2,500+ Miles of Pipe

NIPSCO (Electric & Gas)
- Largest Natural Gas Provider in Indiana
- 785,000 Gas Customers
- 16,000+ Miles of Pipe

Columbia Gas of Massachusetts
- Largest Gas-Only Provider in Massachusetts
- 300,000 Customers
- 4,800+ Miles of Pipe

Columbia Gas of Pennsylvania
- 3rd Largest Natural Gas Provider in Pennsylvania
- 413,000 Customers
- 7400+ Miles of Pipe

Columbia Gas of Maryland
- Complementary to PA Operations
- 33,000 Customers
- 644 Miles of Pipe

Columbia Gas of Virginia
- 3rd Largest Natural Gas Provider in Virginia
- 240,000 Customers
- 4,900+ Miles of Pipe
NiSource Gas Distribution Summary

- 56,000+ miles of main
- 3.3+ million service lines
- 680,000+ Excess flow valves installed since 1980s
- 2011 DOT Annual Report

<table>
<thead>
<tr>
<th></th>
<th>Total Number Service Lines</th>
<th>SFR-EFV Installed</th>
<th>Total EFVs Installed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CGV</td>
<td>256031</td>
<td>4025</td>
<td>113143</td>
</tr>
<tr>
<td>CKY</td>
<td>138095</td>
<td>1113</td>
<td>26206</td>
</tr>
<tr>
<td>CMA</td>
<td>252989</td>
<td>2915</td>
<td>141255</td>
</tr>
<tr>
<td>CMD</td>
<td>35300</td>
<td>817</td>
<td>7263</td>
</tr>
<tr>
<td>COH</td>
<td>1390273</td>
<td>26270</td>
<td>202249</td>
</tr>
<tr>
<td>CPA</td>
<td>418848</td>
<td>8094</td>
<td>76865</td>
</tr>
<tr>
<td>NIPSCo</td>
<td>843626</td>
<td>5070</td>
<td>113560</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>3,335,162</strong></td>
<td><strong>48,304</strong></td>
<td><strong>680,541</strong></td>
</tr>
</tbody>
</table>
## NiSource Gas Distribution Summary

### Number of EFVS Installed in 2012

<table>
<thead>
<tr>
<th></th>
<th>SFR</th>
<th>Multi-Family Residential</th>
<th>Commercial</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVA</td>
<td>5129</td>
<td>110</td>
<td>387</td>
</tr>
<tr>
<td>CKY</td>
<td>1353</td>
<td>53</td>
<td>91</td>
</tr>
<tr>
<td>CMD</td>
<td>661</td>
<td>40</td>
<td>68</td>
</tr>
<tr>
<td>COH</td>
<td>27778</td>
<td>2233</td>
<td>1582</td>
</tr>
<tr>
<td>CPA</td>
<td>8934</td>
<td>651</td>
<td>855</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>43855</strong></td>
<td><strong>3087</strong></td>
<td><strong>2983</strong></td>
</tr>
</tbody>
</table>
2.2.2 Multi-Unit Residential

The EFV must be sized for all customers on the service line. A simple way to
determine the EFV model is to choose the one with a trip flow rating that is
greater than the sum of the meters’ capacities. For instance, a duplex house
with two domestic (Class 250) meters will need an EFV with a trip flow rating
greater than 500 cfm. This will assure that the EFV will not trip with both loads
at their maximum. While the meter-capacity sizing is a conservative guideline,
services to larger numbers of smaller units, such as a four-unit apartment,
could have meters with excess capacity so that the total connected load will
probably be less than the sum of the meters’ capacity.

Another consideration for installation on the service to a multi-unit dwelling is
having to re-light customers if the EFV trips. The EFV activation could be as
intended when the line is severed, but it could also be accidental if a
serviceperson turns a meter on too quickly. All other in-service customers on
the line would immediately have to be turned off and then re-ill after the EFV
resets.

See Exhibit C for additional guidance.

2.2.3 Non-Residential

Many non-residential customers have the same service and meter setting as a
single-family residential customer. An EFV could be installed on those service
lines in the same manner.

Some non-residential customers are also in multi-unit buildings, such as a
shopping plaza, and could be treated similar to the multi-unit residential
situation.

A consideration for non-residential buildings is changing use of the building.
When the service is installed, the use may only require a domestic meter and
have an adequately sized EFV. A future change of use, such as converting to
a restaurant, bakery, dry cleaners, or laundrette, may require a larger meter
without a change to the service line. The larger load may then be greater than
the EFV capacity, and it would have to be removed or replaced.

See Exhibit C for additional guidance.

2.2.4 Planned Upgrades

When service lines are replaced or installed on a pressure system operating at
Large Volume EFV Objectives

- Minimize the consequence of a severed service line
- Install EFVs in small commercial and multi-meter situations (residential & small commercial)
- Avoid service disruption due to EFV trip due to inadequate capacity
- Provide the maximum flexibility for load changes
- Minimize the need to excavate and change EFV for load increases
- Provide a method of sizing EFVs in the field for each application
  - Pipe Size
  - Meter Connection
  - Length from main to meter
CHALLENGES

• Limited experience with EFV use in commercial and multi-meter applications

• Changes in commercial property use

• Unreported load increases

• Service lines with different pipe sizes
The minimum operating pressure of the attached main is 10 psig or higher.

- EFV’s may be installed on services on mains operating at less than 10 psig if an uprate of the system is planned and Engineering is consulted for guidance.

- The entire service line is 2” IPS size or smaller.

- Meter type is diaphragm and rotary, no turbine meters allowed.

- For services with meter delivery pressures above 2 psig or for high pressure services contact Engineering.
Large Volume EFV Installation Guidelines

• Use “Meter Connection Capacity” for sizing
  – The maximum capacity that can be provided by any meter that can be connected to the setting without physical changes

• Where services contain different pipe sizes, use smallest for EFV sizing

• Install the largest capacity EFV that:
  – Satisfies the meter connection capacity
  – Protects the longest length for a given pipe size
Various Meter Setting Configurations
EFV SIZING FOR SERVICES SERVING MULTIPLE METERS AND COMMERCIAL SERVICES OFF MAINS THAT OPERATE AT 10 PSIG OR HIGHER

*FOR SERVICES WITH METER DELIVERY PRESSURES GREATER THAN 2 psig – CONTACT ENGINEERING*

SERVICE LINES SERVING A SINGLE METER (Residential, LV and Commercial)

1. Determine the meter connection capacity using [Table 2]
2. Using [Table 1] determine the largest capacity EFV for the given pipe size and length
3. If the meter connection capacity cannot be met for the given pipe size and length use the EFV that satisfies the meter connection capacity.
4. If the meter connection capacity in [Table 2] is shown as N/A or is larger than the maximum EFV capacity (Series) for the pipe size—STOP, do not install an EFV

SERVICE LINES SERVING MULTIPLE METERS (Residential and Commercial, including manifolds and split services)

1. Using [Table 2] determine the capacity of each meter setting served by the service line
2. If there is an unused space on a manifold or split use the capacity of the largest meter that can be placed in the unused space for ALL meters and unused spaces.
3. Determine the largest capacity EFV for the given pipe size and length
4. If the meter connection capacity cannot be met for the given pipe size and length use the EFV that satisfies the meter connection capacity.
5. If the meter connection capacity is listed as N/A or the total capacity is larger than the EFV for the pipe size—STOP, do not install an EFV
6. If a service line uses different pipe sizes, use the smallest pipe size for EFV sizing.
Table 1 - EFV Maximum Trip length

<table>
<thead>
<tr>
<th>Pipe Size (Label Color)</th>
<th>EFV SERIES</th>
<th>Table 1 - MAXIMUM SERVICE LINE LENGTH IN FEET</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2&quot; CTS</td>
<td>300 145</td>
<td></td>
</tr>
<tr>
<td>3/8&quot; CTS</td>
<td>700 537 1133</td>
<td></td>
</tr>
<tr>
<td>1&quot; CTS</td>
<td>2600 127 1024 2105</td>
<td></td>
</tr>
<tr>
<td>1 1/4&quot; IPS</td>
<td>2600 779 1584</td>
<td></td>
</tr>
<tr>
<td>2&quot; IPS</td>
<td>10000 667 1332 4260</td>
<td></td>
</tr>
</tbody>
</table>

* Maximum service line lengths determined using manufacturer’s guidelines at 10psig
# Table 2 - Meter Connection Capacities

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>000</td>
<td>540</td>
<td>342</td>
<td>540</td>
<td>613</td>
<td>9000</td>
<td>675</td>
<td>1400</td>
<td>710</td>
<td>N/A</td>
<td>734</td>
<td>9000</td>
<td>760</td>
<td>540</td>
<td>791</td>
<td>N/A</td>
<td>815</td>
<td>540</td>
<td>842</td>
<td>N/A</td>
<td>959</td>
<td>N/A</td>
</tr>
<tr>
<td>001</td>
<td>2300</td>
<td>346</td>
<td>540</td>
<td>614</td>
<td>540</td>
<td>680</td>
<td>1140</td>
<td>711</td>
<td>N/A</td>
<td>736</td>
<td>9000</td>
<td>761</td>
<td>540</td>
<td>792</td>
<td>N/A</td>
<td>816</td>
<td>540</td>
<td>846</td>
<td>N/A</td>
<td>960</td>
<td>N/A</td>
</tr>
<tr>
<td>004</td>
<td>540</td>
<td>361</td>
<td>540</td>
<td>615</td>
<td>9000</td>
<td>691</td>
<td>2300</td>
<td>712</td>
<td>N/A</td>
<td>736</td>
<td>9000</td>
<td>762</td>
<td>N/A</td>
<td>793</td>
<td>N/A</td>
<td>817</td>
<td>540</td>
<td>846</td>
<td>N/A</td>
<td>962</td>
<td>N/A</td>
</tr>
<tr>
<td>008</td>
<td>540</td>
<td>384</td>
<td>540</td>
<td>616</td>
<td>1400</td>
<td>682</td>
<td>N/A</td>
<td>713</td>
<td>N/A</td>
<td>737</td>
<td>N/A</td>
<td>763</td>
<td>540</td>
<td>794</td>
<td>N/A</td>
<td>818</td>
<td>540</td>
<td>847</td>
<td>N/A</td>
<td>999</td>
<td>2300</td>
</tr>
<tr>
<td>012</td>
<td>540</td>
<td>388</td>
<td>540</td>
<td>617</td>
<td>9000</td>
<td>883</td>
<td>2300</td>
<td>714</td>
<td>N/A</td>
<td>738</td>
<td>1400</td>
<td>764</td>
<td>540</td>
<td>795</td>
<td>N/A</td>
<td>819</td>
<td>540</td>
<td>853</td>
<td>N/A</td>
<td>965</td>
<td>N/A</td>
</tr>
<tr>
<td>020</td>
<td>540</td>
<td>402</td>
<td>540</td>
<td>618</td>
<td>540</td>
<td>684</td>
<td>3600</td>
<td>715</td>
<td>N/A</td>
<td>739</td>
<td>N/A</td>
<td>765</td>
<td>1400</td>
<td>796</td>
<td>N/A</td>
<td>820</td>
<td>1400</td>
<td>854</td>
<td>N/A</td>
<td>936</td>
<td>N/A</td>
</tr>
<tr>
<td>031</td>
<td>540</td>
<td>415</td>
<td>540</td>
<td>619</td>
<td>1400</td>
<td>685</td>
<td>9000</td>
<td>716</td>
<td>N/A</td>
<td>740</td>
<td>N/A</td>
<td>766</td>
<td>2300</td>
<td>797</td>
<td>N/A</td>
<td>821</td>
<td>2300</td>
<td>860</td>
<td>N/A</td>
<td>960</td>
<td>N/A</td>
</tr>
<tr>
<td>045</td>
<td>540</td>
<td>434</td>
<td>540</td>
<td>620</td>
<td>9000</td>
<td>886</td>
<td>9000</td>
<td>717</td>
<td>N/A</td>
<td>741</td>
<td>2300</td>
<td>767</td>
<td>2300</td>
<td>798</td>
<td>N/A</td>
<td>822</td>
<td>2300</td>
<td>863</td>
<td>N/A</td>
<td>966</td>
<td>N/A</td>
</tr>
<tr>
<td>048</td>
<td>540</td>
<td>438</td>
<td>540</td>
<td>622</td>
<td>540</td>
<td>687</td>
<td>9000</td>
<td>718</td>
<td>540</td>
<td>742</td>
<td>N/A</td>
<td>768</td>
<td>540</td>
<td>799</td>
<td>N/A</td>
<td>823</td>
<td>540</td>
<td>869</td>
<td>N/A</td>
<td>940</td>
<td>N/A</td>
</tr>
<tr>
<td>047</td>
<td>540</td>
<td>446</td>
<td>540</td>
<td>623</td>
<td>9000</td>
<td>888</td>
<td>9000</td>
<td>719</td>
<td>N/A</td>
<td>743</td>
<td>2300</td>
<td>772</td>
<td>540</td>
<td>800</td>
<td>9000</td>
<td>824</td>
<td>N/A</td>
<td>970</td>
<td>540</td>
<td>966</td>
<td>N/A</td>
</tr>
<tr>
<td>054</td>
<td>540</td>
<td>502</td>
<td>540</td>
<td>624</td>
<td>9000</td>
<td>883</td>
<td>N/A</td>
<td>720</td>
<td>N/A</td>
<td>744</td>
<td>2300</td>
<td>775</td>
<td>N/A</td>
<td>801</td>
<td>N/A</td>
<td>825</td>
<td>2300</td>
<td>872</td>
<td>N/A</td>
<td>963</td>
<td>N/A</td>
</tr>
<tr>
<td>062</td>
<td>540</td>
<td>600</td>
<td>2300</td>
<td>625</td>
<td>9000</td>
<td>690</td>
<td>2300</td>
<td>722</td>
<td>745</td>
<td>9000</td>
<td>803</td>
<td>9000</td>
<td>806</td>
<td>9000</td>
<td>907</td>
<td>N/A</td>
<td>966</td>
<td>N/A</td>
<td>966</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>064</td>
<td>540</td>
<td>602</td>
<td>540</td>
<td>625</td>
<td>540</td>
<td>682</td>
<td>9000</td>
<td>723</td>
<td>1400</td>
<td>746</td>
<td>2300</td>
<td>777</td>
<td>N/A</td>
<td>804</td>
<td>9000</td>
<td>827</td>
<td>N/A</td>
<td>974</td>
<td>N/A</td>
<td>974</td>
<td>N/A</td>
</tr>
<tr>
<td>066</td>
<td>540</td>
<td>603</td>
<td>540</td>
<td>627</td>
<td>N/A</td>
<td>695</td>
<td>N/A</td>
<td>724</td>
<td>2300</td>
<td>747</td>
<td>9000</td>
<td>770</td>
<td>N/A</td>
<td>905</td>
<td>9000</td>
<td>928</td>
<td>N/A</td>
<td>997</td>
<td>N/A</td>
<td>977</td>
<td>N/A</td>
</tr>
<tr>
<td>080</td>
<td>540</td>
<td>604</td>
<td>540</td>
<td>633</td>
<td>540</td>
<td>690</td>
<td>N/A</td>
<td>725</td>
<td>1400</td>
<td>748</td>
<td>9000</td>
<td>779</td>
<td>N/A</td>
<td>806</td>
<td>N/A</td>
<td>829</td>
<td>540</td>
<td>860</td>
<td>N/A</td>
<td>999</td>
<td>N/A</td>
</tr>
<tr>
<td>144</td>
<td>540</td>
<td>605</td>
<td>2300</td>
<td>634</td>
<td>1400</td>
<td>698</td>
<td>N/A</td>
<td>726</td>
<td>540</td>
<td>749</td>
<td>N/A</td>
<td>760</td>
<td>1400</td>
<td>807</td>
<td>N/A</td>
<td>830</td>
<td>540</td>
<td>885</td>
<td>N/A</td>
<td>930</td>
<td>N/A</td>
</tr>
<tr>
<td>175</td>
<td>540</td>
<td>606</td>
<td>540</td>
<td>633</td>
<td>1400</td>
<td>700</td>
<td>N/A</td>
<td>727</td>
<td>N/A</td>
<td>750</td>
<td>N/A</td>
<td>781</td>
<td>N/A</td>
<td>808</td>
<td>N/A</td>
<td>831</td>
<td>540</td>
<td>895</td>
<td>N/A</td>
<td>935</td>
<td>N/A</td>
</tr>
<tr>
<td>178</td>
<td>540</td>
<td>607</td>
<td>540</td>
<td>646</td>
<td>1400</td>
<td>701</td>
<td>N/A</td>
<td>728</td>
<td>N/A</td>
<td>751</td>
<td>1400</td>
<td>783</td>
<td>N/A</td>
<td>809</td>
<td>N/A</td>
<td>833</td>
<td>540</td>
<td>900</td>
<td>N/A</td>
<td>931</td>
<td>N/A</td>
</tr>
<tr>
<td>225</td>
<td>540</td>
<td>608</td>
<td>540</td>
<td>650</td>
<td>2300</td>
<td>705</td>
<td>9000</td>
<td>729</td>
<td>N/A</td>
<td>755</td>
<td>540</td>
<td>784</td>
<td>1400</td>
<td>810</td>
<td>N/A</td>
<td>834</td>
<td>908</td>
<td>2300</td>
<td>N/A</td>
<td>948</td>
<td>N/A</td>
</tr>
<tr>
<td>240</td>
<td>540</td>
<td>609</td>
<td>2300</td>
<td>654</td>
<td>2300</td>
<td>706</td>
<td>9000</td>
<td>730</td>
<td>1400</td>
<td>756</td>
<td>540</td>
<td>786</td>
<td>N/A</td>
<td>811</td>
<td>N/A</td>
<td>835</td>
<td>938</td>
<td>2200</td>
<td>N/A</td>
<td>955</td>
<td>N/A</td>
</tr>
<tr>
<td>250</td>
<td>540</td>
<td>610</td>
<td>540</td>
<td>658</td>
<td>9000</td>
<td>707</td>
<td>9000</td>
<td>731</td>
<td>540</td>
<td>757</td>
<td>540</td>
<td>788</td>
<td>N/A</td>
<td>812</td>
<td>N/A</td>
<td>837</td>
<td>950</td>
<td>N/A</td>
<td>949</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>315</td>
<td>540</td>
<td>611</td>
<td>2300</td>
<td>662</td>
<td>9000</td>
<td>708</td>
<td>N/A</td>
<td>732</td>
<td>N/A</td>
<td>758</td>
<td>540</td>
<td>789</td>
<td>N/A</td>
<td>813</td>
<td>N/A</td>
<td>840</td>
<td>540</td>
<td>954</td>
<td>N/A</td>
<td>964</td>
<td>N/A</td>
</tr>
<tr>
<td>338</td>
<td>540</td>
<td>612</td>
<td>2300</td>
<td>672</td>
<td>N/A</td>
<td>709</td>
<td>N/A</td>
<td>733</td>
<td>2300</td>
<td>759</td>
<td>540</td>
<td>790</td>
<td>N/A</td>
<td>814</td>
<td>540</td>
<td>841</td>
<td>N/A</td>
<td>958</td>
<td>N/A</td>
<td>964</td>
<td>N/A</td>
</tr>
</tbody>
</table>

*Meter K&S (Kind and Size) codes are Columbia specific references*
Field Instructions – Single Meter

Large Residential and Commercial

- Determine the meter connection capacity using [Table 2]
- Using [Table 1] determine the largest capacity EFV for the given pipe size and length
- If the meter connection capacity cannot be met for the given pipe size and length use the EFV that satisfies the meter connection capacity
- If the meter connection capacity in [Table 2] is shown as N/A or is larger than the maximum EFV capacity (Series) for the pipe size—STOP, do not install an EFV
Maximum EFV Capacity

- 1” cts service line
- Length 110’
- 1 x 630 meter (619)
  - Capacity = 1400cfh @ 2” drop

EFV = 1800cfh (max length 258’)

EFV = 2600cfh (max length 127’)

NISOURCE
GAS DISTRIBUTION
Field Instructions – Multi-Meter

Residential and Commercial (including manifolds and split services)

- Using [Table 2] determine the capacity of each meter setting served by the service line.
- If there is an unused space on a manifold or split use the capacity of the largest meter that can be connected for this space.
- Total the capacities for ALL meters and unused spaces.
- Using the [Table 1] determine the largest capacity EFV for the given pipe size and length.
- If the total meter connection capacity cannot be met for the given pipe size and length use the EFV that satisfies the meter connection capacity.
- If any meter connection capacity is listed as N/A or the total capacity is larger than the EFV capacity (Series) for the pipe size– STOP, do not install an EFV.
Maximum EFV Capacity

• 1-1/4” IPS service line
• Length 250’
• 4 x 250 meter (608)
  ➢ Capacity = 2160cfh @ 2” drop

EFV = 2600cfh (max length 779’)

![Diagram showing EFV capacity](image)
Utilize Available Protection

- 1” cts service line
- Length 250’
- 4 x 250 meter (608)
  - Capacity = 2160cfh @ 2” drop

EFV = 2600cfh (max length 127’)

127’ Protected

250’
Columbia’s Perspective

• Majority of damages occur within the road right of way
• Utilize EFVs meeting capacity to protect as much of the service line as we can even where lengths exceed max trip length
• Flexibility for changes in commercial property use
• Maximize EFVs while minimizing re-excavation and EFV trip issues
• Reverse the process for new installations to size the service line pipe size
Experiences with LV EFV Failures

• 4 Failures Reported in 2012
• 3 In-Service Failures
  – 1 undersized
  – 1 with plastic shavings caught in spring
  – 1 unknown as valve was not presented to investigator
• 1 damaged prior to installation – end out of roundness
• Overall, good operating history to date
Going forward

• Re-evaluate after some experience is gained

• Additional services could be provided EFVs by upsizing the piping (construction cost increases)

• Flexibility required for commercial may not be necessary for multi-meter residential
Damage Prevention

- Improvements in our damage prevention efforts could help avoid the cuts to begin with
  - Eliminates the safety issue for us and our customers
  - Avoids disruption of service
  - Reduces interruptions of regular work activities
  - Reduces the incidence of emergency response and repair situations

- We would rather limit the risk of a catastrophic incident by having an effective damage prevention program and not rely on the EFV
Summary

• Increase EFV installations
• Simple Sizing method
• Provides flexibility for change
• Reduces re-excavation
• Protection from unintended trip
OGA Technical Seminar
Excess Flow Valves/Small Commercial & Multiple Meter Applications

Questions

Jerry Taggart
Compliance Specialist
Columbia Gas
jrtgga@nisource.com
614-481-1105

March 22, 2013