Design and Standardization of Stations at AltaGas Utilities

May 21, 2015

Vincent Chou, P.Eng.
Senior Engineer – System Integrity & Standards
Introduction to AltaGas Ltd. – Utility Assets
Introduction to AltaGas Utilities Inc. (AUI)

- Approximately 230 employees
- Residential, commercial, and some industrial customers
- ~78,000 delivery points
- ~12,500 mi (~20,000 km) of pipe (<10% is transmission or high pressure)
- Mainly <100 psig (690 kPa)
- >750 stations (including farm taps)
- ~220 stations (farm taps and others excluded) relevant to today’s topic
Station Types Relevant to Standardization

Meter Stations (a.k.a. RMO Stations):

- Receipt from external transmission line (ANSI 600) and supply to our system (ANSI 300 or 150)
- From our system (ANSI 300) to industrial customer (ANSI 150)
- Typically includes lineheater, meter, regulation and overpressure protection, odorization, and a building.
Station Types Relevant to Standardization

Town Border Stations:

- From our high pressure system (ANSI 300) to our distribution system (ANSI 150)

- Typically includes pressure recording, regulation and overpressure protection in a building.

Standard designs developed for these station types. Flow rates range from 10,000 scfh (280 m³/hr) up to 500,000 scfh (14,000 m³/hr).
Station Design Prior to Standardization

- Site layout determined piping configuration – design was time-consuming
- Flow direction not standard
- Everything sized to suit with calculations
- “Design by copy-paste”
- Station footprint not standardized so land size was not fixed
Example: Town Border Station LE-329 (2006)
Example: Town Border Station LE-329 (2006)
Example: Meter Station WB-013 (2007)
Example: Meter Station WB-013 (2007)
Why Standardize?

Predictable Standards + Familiarity

= Time & Costs Saved, Greater Efficiency

- Engineering time greatly reduced
- Drafting & piping design time greatly reduced
- Land acquisitions more predictable
- Procurement more predictable
- Welding and other construction more efficient
- Operations and maintenance more efficient
- Standardized system easier for new people to learn
Why Standardize?

- AltaGas Utilities began station replacement program in 2009
- Replacement program was a driver for standardization program
Example: Town Border Station HA-005 (2014)
First Phase of Standardization – 2010

Established:

- Overall configuration and footprint
- Piping templates
- Standardized equipment
- Station model numbering
First Phase – Overall Configuration
Example: Meter Station AT-078 (2013)
First Phase – Piping Templates, Equipment
Example: Meter Station LE-079 (2011)
Example: Town Border Station ST-004 (2014)
Example: Meter Station SP-014 (2014)
Example: Meter Station SP-252 (2014)
**MODEL NUMBERS**

<table>
<thead>
<tr>
<th>WM-600-300-3GT</th>
</tr>
</thead>
<tbody>
<tr>
<td>WM-600-300-3M1480</td>
</tr>
<tr>
<td>WM-600-300-NM</td>
</tr>
<tr>
<td>SM-600-300-3GT</td>
</tr>
<tr>
<td>SM-600-300-3M1480</td>
</tr>
<tr>
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</tr>
<tr>
<td>WM-600-150-3GT</td>
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<td>WM-600-150-3M1480</td>
</tr>
<tr>
<td>WM-600-150-NM</td>
</tr>
<tr>
<td>WM-600-150-3M175</td>
</tr>
<tr>
<td>WM-600-150-5M175</td>
</tr>
<tr>
<td>WM-600-150-7M175</td>
</tr>
<tr>
<td>WM-600-150-11M175</td>
</tr>
<tr>
<td>SM-300-150-3GT</td>
</tr>
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</tr>
<tr>
<td>SM-300-150-NM</td>
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<td>SM-300-150-3M175</td>
</tr>
<tr>
<td>SM-300-150-5M175</td>
</tr>
<tr>
<td>SM-300-150-7M175</td>
</tr>
<tr>
<td>SM-300-150-11M175</td>
</tr>
</tbody>
</table>

*eg. WM-600-150-3GT*
Second Phase of Standardization – 2012

Developed a “Station Sizing Tool”:

- Integration of several Excel calculation sheets using if-then logic
- Input: Pressure In, Flow Rate, Pressure Out
- Output: Station Model, Errors & Warnings
- Also produces equipment specifications and rough cost estimate
Please enter all information in the red boxes below to obtain a preliminary sizing for a major station (press Tab to cycle through the boxes):

- **Inlet MOP (psig):** 1400
- **Current Max. Flowrate (scfh):** 10000
- **Future Growth (%):** 20%
- **Future Max. Flowrate (scfh):** 12000
- **Outlet MOP (psig):** 100
- **Outlet Set Pressure (psig):** 60

Inlet Max. NOP (psig):

- **Inlet Min. NOP (psig):** 800
- **Current Min. Flowrate (scfh):** 1000

If in doubt, set Inlet Max. NOP = Inlet MOP. Inlet Min. NOP must be greater than Outlet Set Pressure.

- **Station Type:** PMS
- **Odorization Required:** Yes
- **Brick Exterior Required:** No

Valid entries are: PMS, SMS, or TBS. Valid entries are: Yes or No. Valid entries are: Yes or No.

If you are proceeding with the design produced below, please enter the following information:

- **Station Number:** LE-079
- **Your Name:** Vincent Chou
- **Project Number:**
- **Date:** 2014-JUN-03
- **Instrument No. (from Tech Services):**

**RESULTS**

Recommended Equipment:

- **Station Model Number:** WM-600-150-3M175
  - **Approx. Cost:** $176,000

Complete With:

- **Grit Industries Lineheater:** 140,000 BTU/hr.
  - **Approx. Cost:** $50,300 (cost associated with addition of lineheater)
- **Bypass Odorant Tank:** 9.4 gal., 500 psig.
  - **Approx. Cost:** $11,000 (cost associated with addition of odorant tank)

**Approximate Total Cost:** $237,300

Errors preventing determination of a Standard Station Model Number:

- **ANSI Classes:** None
- **Regulators:** None
- **Meter:** None

Warnings:

- **Regulator:** None
- **Meter:** None
- **Flow Velocity:** None
- **Lineheater:** None
- **Odorant tank:** None
### INPUTS

Please enter all information in the red boxes below to obtain a preliminary sizing for a major station (press Tab to cycle through the boxes):

<table>
<thead>
<tr>
<th>Inlet MOP (psig)</th>
<th>1400</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inlet Max. NOP (psig)</td>
<td>1200</td>
</tr>
<tr>
<td>Inlet Min. NOP (psig)</td>
<td>800</td>
</tr>
</tbody>
</table>

| Current Max. Flowrate (scfh) | 10000 |
| Current Min. Flowrate (scfh) | 1000 |

Future Growth (%): 20%

Future Max. Flowrate (scfh): 12000

Outlet MOP (psig): 100

Outlet Set Pressure (psig): 60

If in doubt, set Inlet Max. NOP = Inlet MOP.

Inlet Min. NOP must be greater than Outlet Set Pressure.

Legend:
- Represents information entered on the Main Page.
- Represents a result determined on the Main Page.
- Represents a result determined on another page.

Valid entries are: PMS, SMS, or TBS.
Valid entries are: Yes or No.

Station Type: PMS

Odorization Required? Yes

Brick Exterior Required? No

If you are proceeding with the design produced below, please enter the following information:

Station Number: LE-079

Your Name: Vincent Chou

Date: 2014-JUN-03

### RESULTS

**Recommended Equipment:**

- **Station Model Number:** WM-600-150-3M175
- **Approx. Cost:** $176,000

**Complete With:**

- **Grit Industries Lineheater:** 140,000 BTU/hr.
  - **Approx. Cost:** $50,300
  - (cost associated with addition of lineheater)

- **Bypass Odorant Tank:** 9.4 gal., 500 psig.
  - **Approx. Cost:** $11,000
  - (cost associated with addition of odorant tank)

**Approximate Total Cost:** $237,300

**Errors preventing determination of a Standard Station Model Number:**

- **ANSI Classes:** None
- **Regulators:** None
- **Meter:** None

**Warnings:**

- **Regulator:** None
- **Meter:** None
- **Flow Velocity:** None
- **Lineheater:** None
- **Odorant tank:** None

---

**Example:** Meter Station LE-079
Please enter all information in the red boxes below to obtain a preliminary sizing for a major station (press Tab to cycle through the boxes):

- **Inlet MOP (psig):** 1400
- **Inlet Max. NOP (psig):** 1200
- **Inlet Min. NOP (psig):** 800
- **Current Max. Flowrate (scfh):** 10000
- **Current Min. Flowrate (scfh):** 1000
- **Future Growth (%):** 20%
- **Future Max. Flowrate (scfh):** 12000
- **Outlet MOP (psig):** 100
- **Outlet Set Pressure (psig):** 60

If in doubt, set Inlet Max. NOP = Inlet MOP. Inlet Min. NOP must be greater than Outlet Set Pressure.

Legend:
- Represents information entered on the Main Page.
- Represents a result determined on the Main Page.
- Represents a result determined on another page.

**Station Type:** PMS
- Valid entries are: PMS, SMS, or TBS.
- Represents information entered on another page.

**Odorization Required:** Yes
- Valid entries are: Yes or No.
- Represents a result determined on another page.

**Brick Exterior Required:** No
- Valid entries are: Yes or No.
- Represents a result determined on another page.

If you are proceeding with the design produced below, please enter the following information:

- **Station Number:** LE-079
- **Your Name:** Vincent Chou
- **Atmospheric Pressure (psia):** -
- **Project Number:** -
- **Date:** 2014-JUN-03
- **Instrument No. (from Tech Services):** -

**RESULTS**

**Recommended Equipment:**
- **Station Model Number:** WM-600-150-3M175
- **Approx. Cost:** $176,000

**Complete With:**
- **Grit Industries Lineheater:** 140,000 BTU/hr.
  - **Approx. Cost:** $50,300
- **Bypass Odorant Tank:** 9.4 gal., 500 psig.
  - **Approx. Cost:** $11,000

**Approximate Total Cost:** $237,300

**Errors preventing determination of a Standard Station Model Number:**
- **ANSI Classes:** None
- **Regulators:** None
- **Meter:** None

**Warnings:**
- **Regulator:** None
- **Meter:** None
- **Flow Velocity:** None
- **Lineheater:** None
- **Odorant tank:** None

Example: Meter Station LE-079
RESULTS

Recommended Equipment:

Station Model Number: WM-600-150-3M175
Approx. Cost: $176,000

Complete With:

Grit Industries Lineheater: 140,000 BTU/hr.
Approx. Cost: $50,300 (cost associated with addition of lineheater)
Bypass Odorant Tank: 9.4 gal., 500 psig.
Approx. Cost: $11,000 (cost associated with addition of odorant tank)

Approximate Total Cost: $237,300

Errors preventing determination of a Standard Station Model Number:

ANSI Classes: None
Regulators: None
Meter: None

Warnings:

Regulator: None
Meter: None
Flow Velocity: None
Lineheater: None
Odorant tank: None

Jump to Flow Velocity Checks
Jump to Cost Estimate
**Inputs**

Please enter all information in the red boxes below to obtain a preliminary sizing for a major station (press Tab to cycle through the boxes):

<table>
<thead>
<tr>
<th>Inlet MOP (psig)</th>
<th>Current Max. Flowrate (scfh)</th>
<th>Current Min. Flowrate (scfh)</th>
<th>Future Growth (%)</th>
<th>Future Max. Flowrate (scfh)</th>
<th>Outlet MOP (psig)</th>
<th>Outlet Set Pressure (psig)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1200</td>
<td>100,000</td>
<td>10,000</td>
<td>20%</td>
<td>120,000</td>
<td>740</td>
<td>445</td>
</tr>
</tbody>
</table>

- If in doubt, set Inlet Max. NOP = Inlet MOP.
- Inlet NOP must be greater than Outlet Set Pressure.

**Legend:**
- Represents information entered on the Main Page.
- Represents a result determined on the Main Page.
- Represents a result determined on another page.

**Odorization Required?** Yes

**Brick Exterior Required?** No

**Results**

Recommended Equipment:
- Station Model Number: SM-600-300-3M1480
- Approx. Cost: $186,100

Complete With:
- Grit Industries Lineheater: 315,000 BTU/hr.
  - Approx. Cost: $81,500 (cost associated with addition of lineheater)
- Bypass Odorant Tank: 54 gal., 1000 psig.
  - Approx. Cost: $18,600 (cost associated with addition of odorant tank)

Approximate Total Cost: $286,200

Errors preventing determination of a Standard Station Model Number:
- ANSI Classes: None
- Regulators: None
- Meter: None

Warnings:
- Regulator: None
- Meter: None
- Flow Velocity: None
- Lineheater: None
- Odorant tank: None

Result: SM-600-300-3M1480

**Example: Meter Station AT-036**
<table>
<thead>
<tr>
<th>Tag</th>
<th>Manufacturer</th>
<th>Model</th>
<th>Cor. Size</th>
<th>Type</th>
<th>Pressure Rating</th>
<th>Type</th>
<th>Each Type</th>
<th>Description</th>
<th>Station</th>
<th>Purpose</th>
<th>Dim.</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>XTS</td>
<td>Hatchcraft.</td>
<td>18200</td>
<td>2.00</td>
<td>wist</td>
<td>150</td>
<td>Pilot Operated</td>
<td>100</td>
<td>Capacity</td>
<td>#25000</td>
<td>OPERATE</td>
<td>-</td>
<td>-</td>
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<td>-</td>
</tr>
</tbody>
</table>
Current State

• Engineering & Drafting – approx. 2 to 3 times faster

• Procurement – can now stock up, purchase earlier, buy in bulk

• Construction – can swap stations between projects, pre-fab early & in winter

• Operations – can carry fewer repair parts, operating & maintenance familiarity

• AUI is now capable of installing approximately 2 to 3 times the number of stations per year that we did prior to standardization.
Next Steps

- New configurations – ie. two-outlet stations
- Equipment refinements – ie. bring odorizer inside building
- Refining criteria for requiring a lineheater – ie. at Town Border Stations
Discussion Period

Where are peer companies at with station standardization?

Questions and comments?