Northeast Association of Rail Shippers

The Tank Car Story: The Builder Perspective

Presented by Robert E. Pickel Jr.
Senior Vice President, Marketing and Sales
National Steel Car N.A. Inc.

October 1, 2014
Our Company

- Founded in **1912**, celebrating over **100 years** of car building excellence
- Serving the North American and International railcar markets
- Largest, single-site railcar manufacturing plant in North America, employing **2,000** team members
- **All Types of Freight Cars:** 12 different car types / over **76** models
- Capacity to produce up to **15,000** railcars annually
- Flexible production lines, state of the art blast/paint/finishing lines
- Ongoing plant modernization
- Certified to AAR M-1003 & AAR M-1002
- The only car builder certified to ISO 9001-2008 in North America
Company Portfolio

All Types of Freight Cars
Tank Car Market: Issues… and More

- Crude oil and ethanol by rail: Landscape
- East coast: Energy dependence and geographical situation
- North American tank car fleet
- Tank car changes over time
- Tank car deliveries projection
- Tank car specifications
- Tank car retrofitting challenge
- How could new regulations impact the market?
Long Term Tank Carload Projection: **STRONG!**
Major U.S. Oil Plays and Permit Activity

Source: HPDI, Permit activity in past 90 days, September 2013
Canada and U.S. Crude Oil Pipeline

N.E. has very limited pipeline access

Source: Canadian Energy Pipeline Association
Geographic Pricing Disparities:

East Coast high demand, high crude price and lack of pipelines:
Crude oil moved by rail or by sea

Source: AFPM Map, Bloomberg and WTI prices, Midland, Clearbrook, LLS (estimates); North Dakota, Wyoming, DJ from Flint Hills and estimates, Canadian assumptions and estimates (Bloomberg)
Crude Oil Spills on Canadian Railroads

2013: Lac Mégantic 47 people killed

Main-Track Derailments

Source: Transportation Safety Board of Canada
## Estimates for Current Fleet of Rail Tank Cars

<table>
<thead>
<tr>
<th>Tank Car Category (as of 3rd. Q. 2013)</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total # of Tank Cars</td>
<td>334,869</td>
</tr>
<tr>
<td>Total # of DOT 111</td>
<td>272,119</td>
</tr>
<tr>
<td>Total # of DOT 111 in Flammable Liquid Service</td>
<td>80,500</td>
</tr>
<tr>
<td>Total # CPC 1232 in Flammable Liquid Service</td>
<td>17,300</td>
</tr>
<tr>
<td>Total # of Tank Cars in Crude Oil Service</td>
<td>42,500</td>
</tr>
<tr>
<td>Total # of Tank Cars in Ethanol Service</td>
<td>29,780</td>
</tr>
<tr>
<td>CPC 1232 (Jacketed) in Crude Oil Service</td>
<td>4,850</td>
</tr>
<tr>
<td>CPC 1232 (Jacketed) in Ethanol Service</td>
<td>0</td>
</tr>
<tr>
<td>CPC 1232 (Non-Jacketed) in Crude Oil Service</td>
<td>9,400</td>
</tr>
<tr>
<td>CPC 1232 (Non-Jacketed) in Ethanol Service</td>
<td>480</td>
</tr>
<tr>
<td>Dot 111 (Jacketed) in Crude Oil Service</td>
<td>5,500</td>
</tr>
<tr>
<td>Dot 111 (Jacketed) in Ethanol Service</td>
<td>100</td>
</tr>
<tr>
<td>Dot 111 (Non-Jacketed) in Crude Oil Service</td>
<td>22,800</td>
</tr>
<tr>
<td>Dot 111 (Non-Jacketed) in Ethanol Service</td>
<td>29,200</td>
</tr>
</tbody>
</table>

Source: RSI presentation at the NTSB rail Safety Forum, updated June 18, 2014
Differences between the different Tank Cars Types

<table>
<thead>
<tr>
<th>Description</th>
<th>CAPACITY (gal)</th>
<th>#1 Comm.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acid</td>
<td>11,500-18,499</td>
<td>Sulph. Acid</td>
</tr>
<tr>
<td>Acid</td>
<td>18,500-21,499</td>
<td>Ind. Inorg. Acids, Metallic Comp.</td>
</tr>
<tr>
<td>Gen. Service</td>
<td>11,500-18,499</td>
<td>Corn Syrup, Sulph.</td>
</tr>
<tr>
<td>Gen. Service</td>
<td>18,500-21,499</td>
<td>Corn Syrup, Fert. Solution</td>
</tr>
<tr>
<td>Gen. Service</td>
<td>21,500-24,499</td>
<td>Asphalt, Glycols</td>
</tr>
<tr>
<td>Gen. Service</td>
<td>24,500-27,499</td>
<td>Soybean Oil, Nut oils</td>
</tr>
<tr>
<td>Gen. Service</td>
<td>27,500-31,499</td>
<td>Alcohols, Crude Petroleum</td>
</tr>
<tr>
<td>Press. 340 psi</td>
<td>&gt; 31,500</td>
<td>Liq. gas, Anhydrous Ammonia</td>
</tr>
<tr>
<td>Press. 400 psi</td>
<td>&gt; 31,500</td>
<td>Liquified Gas, Other</td>
</tr>
<tr>
<td>Press. 400 &amp; 500 psi</td>
<td>11,500-18,499</td>
<td>Chlorine, Sulph. Acid</td>
</tr>
<tr>
<td>Press. 500 psi</td>
<td>12,000-18,000</td>
<td>Chlorine, Sulph. Acid</td>
</tr>
</tbody>
</table>
Tank Car Fleet Age

The average age of the tank car fleet is 16 years
New Tank Car Deliveries

<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>End of June</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tank Cars</td>
<td>28,996</td>
<td>17,227</td>
<td>35,227</td>
<td>36,600</td>
<td>35,200</td>
</tr>
<tr>
<td>C.H &lt; 3,500 c.f.</td>
<td>5,602</td>
<td>5,668</td>
<td>14,508</td>
<td>14,450</td>
<td>7,980</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>53,050</strong></td>
<td><strong>30,010</strong></td>
<td><strong>66,710</strong></td>
<td><strong>84,200</strong></td>
<td><strong>80,500</strong></td>
</tr>
<tr>
<td>Tank and C.H &lt; 3,500 c.f. Cars as % of Total</td>
<td>65%</td>
<td>76%</td>
<td>74%</td>
<td>61%</td>
<td>53%</td>
</tr>
</tbody>
</table>
Tank Car Designs Over Time
NSC GP Tank Car – 31,800 g.
Tank Cars Yesterday and Today

Prior to 2004:

- Tank cars in manifest train service in small numbers
- 263,000 lb. GRL
- Shell steel A-515-70
- Capacity up to 25,000 gallons
- Exterior coils replacing interior ones
- Limited crashworthiness

2004-2010:

- Primarily 30,000 gallon General Purpose cars for ethanol
- Increasing use of car block shipments and some unit trains
- Still 263,000 lb. GRL
Tank Cars Yesterday and Today

Current CPC-1232 tank cars built for crude oil:

- AAR CPC-1232 applies for cars built after Oct. 2011
- 286,000 lb. GRL
- Half or full head shields
- Larger capacity
- Non-jacketed car shell & half head shield made of 1/2” thick AAR TC-128 Grade B normalized
- Jacketed car shell 7/16” & ½” full head shield TC-128 Grade B normalized + 11 GA jacket
- Top fitting protection mandatory
- Reclosing high flow PRD valve (minimum 27,000 scfm)
- 29,000 gallon for jacketed CPC-1232 car and 31,800 gallon for non-jacketed CPC-1232 car
Plasma cutting tables are used to produce the steel plates that will be rolled to form the shells
The Tank Car Manufacturing Story

Tank assembly comprised of 2 heads and 6 shell sections, shown are 2 single shells being longitudinally welded

Each plate is rolled to form a shell section

Shells are welded longitudinally
The Tank Car Manufacturing Story

Heads are welded to a shell section
The Tank Car Manufacturing Story

Bolsters and stub sills are applied next

Prefabricated manways are applied to the tank
The Tank Car Manufacturing Story

Each tank is stress relieved at a temperature of 1100º F as required by the AAR

Hydrostatic testing is done to insure watertightness
The Tank Car Manufacturing Story

Brake and safety appliances are applied to the car. The car is now ready for blasting.

Coating is applied to the blasted car.
The Tank Car Manufacturing Story

Painted tank as it comes out of the automated paint booth
The Tank Car Manufacturing Story

Valves are installed

The final step consist of the application of decals
The Tank Car Manufacturing Story

NSC GP Tank Car
31,800 gal.

NSC CI Tank Car
29,000 gal.
The Tank Car Manufacturing Story

END
Summary of US DOT - and TC Notice of Proposed Rulemaking New Cars

Commodities:
- U.S.: HHFT
- Canada: Flammable

Liquids

<table>
<thead>
<tr>
<th>Option</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>TC-140</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PHMSA</td>
<td>AAR 2014</td>
<td>ENHANCE CPC-1232</td>
<td>Exceeds CPC-1232</td>
</tr>
<tr>
<td>Bottom outlet handle removed or redesigned</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>GRL 285k</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>-</td>
</tr>
<tr>
<td>Head Shield Full Height ½&quot; thick</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Reclosing Pressure Valve</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Shell Thickness 9/16&quot; Minimum</td>
<td>Y</td>
<td>Y</td>
<td>7/16&quot; min.</td>
<td>Y</td>
</tr>
<tr>
<td>Jacket min. 11 GA A1011 Steel</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Tank Steel TC-128 Normalized</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Norm.</td>
</tr>
<tr>
<td>Top fitting Protection for Rollover at 9 mph</td>
<td>Y</td>
<td>AAR Specs Apx. E, Para 10.2.1</td>
<td>AAR Specs Apx. E, Para 10.2.1</td>
<td>Exceeds CPC-1232</td>
</tr>
<tr>
<td>Thermal Protection CFR 179.18 &amp; PRD 173.31</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>ECP Braking</td>
<td>Y</td>
<td>Y or EOT</td>
<td>DP or EOT</td>
<td>Y</td>
</tr>
</tbody>
</table>
Tank Car Retrofitting Challenge

✓ No new repair facilities added in years
✓ Many repair facilities do not have
  • Capacity to roll the sections when larger nozzles required
  • Stress relieve oven
  • Paint and blast facilities
  • Sufficient trained staff
  • Tank cleaning capacity
✓ Potential lead time problems for:
  • TC-128 steel shortage of raw materials
  • Dual flow pressure relieve valves
  • Full head shields
  • Replacement of other valves
  • Tank car qualification load at facilities
Sources disagree on the retrofit industry capacity:

- RSI estimates capacity at 5,500 cars/year
- Over a 12 years period approximately 23,500 cars (DOT111NJ and DOT111J) may be scrapped
- Alltranstek estimates capacity for the next 5 years:

### Estimated Shop capacity for Next 5 Years

<table>
<thead>
<tr>
<th>Year</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td># of Retrofit Shops</td>
<td>54</td>
<td>56</td>
<td>58</td>
<td>60</td>
<td>62</td>
</tr>
<tr>
<td>Potential Retrofits/yr.</td>
<td>2,430</td>
<td>2,883</td>
<td>3,089</td>
<td>3,303</td>
<td>3,711</td>
</tr>
</tbody>
</table>
Proposed Modification Timeline

Assuming that new rules are implemented January 1, 2015:

a) Retrofit or phase out DOT-111 NJ by January 1, 2021 after which they would no longer be allowed to be used in that service
b) Retrofit or phase out DOT-111 J by January 1, 2021, after which they would no longer be allowed to be used in that service
c) Retrofit or phase out CPC-1232 NJ by January 1, 2025 after which they would no longer be allowed to be used in that service.

… after which they the cars would no longer be allowed to be used for crude oil and ethanol service

Disclaimer: The Data provided in the above table are for illustration purpose only.
Conclusion

- There is no unanimity in the course of action to be taken.
- API scenarios, including the 23,500 cars to be scrapped, do not show tank car shortage.
- The API scenario projects that approximately 68,000 new tank cars may be required.
Thank you

Questions?