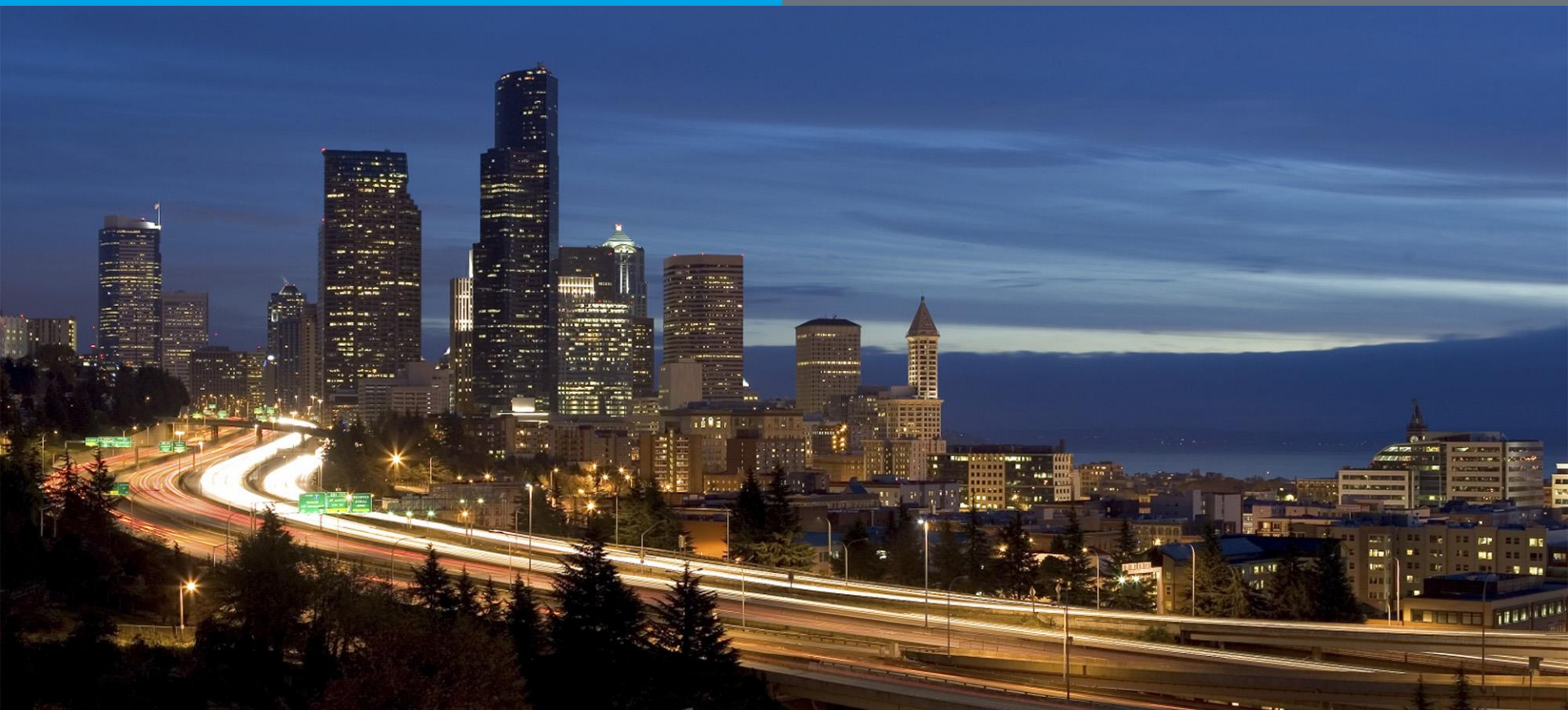


Alt Fuel Vehicle Incidents



**NGV Technology Forum
San Diego, CA-2016 10 19**

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- All fuels have inherent risks and all vehicle types are subject to fire and other incidents. Trash trucks are particularly susceptible to fire in the load, hydraulics and electrical systems.
- The incidents reported herein are limited to CNG, but all vehicles including battery technologies have incident risk and should be treated with respect.

- Average of 152,300 automobile fires per year in 2006-2010 causing an annual average:
 - 209 civilian deaths, 764 civilian injuries, and \$536 million in direct property damage.
- 17 auto fires were reported per hour—4 deaths every week.
- Mechanical or electrical-66% of automobile fires. Collisions and overturns-4% of vehicle fires and 60% deaths.
- 2% of fires began in fuel systems-caused 15% of deaths.

Source: NFPA's "[Automobile Fires in the U.S.: 2006-2010 Estimates](#)" report by Marty Ahrens, September 2012.

Incident 1

Refuse Truck Fire-Indianapolis IN

- January 27, 2015
- 2014 Autocar-McNeilus with 2006 Cummins
- Roof mounted tanks.



1-CNG Refuse Truck Fire-Indianapolis IN

- Fire in the load—driver did not drop load although that is Republic protocol.
- PRDs do not appear to have actuated—possibly due to cold ambient temps combined with chimney effect and fire suppression activities may have cooled the PRDs.



- One tank failed due to temperature, this tank rupture caused a second tank to rupture which caused the remaining tanks to be blown out of the tank frame and deposited up to several hundred feet away.
- No injuries or fatalities



Incident 2

Truck Vs Train—Buffalo NY

- June 23, 2015
- 2014 Kenworth Tractor with load in tow.
- Saddle mounted tanks.
- Distracted driver struck by slow moving train.
- Tank was punctured and released fuel...fire ensued.
- Video



2-CNG Truck vs Train—Buffalo NY



Incident 3

CNG Peterbilt Tractor – Nashville TN

3-Peterbilt Tractor with Saddle Tanks

- Undamaged vehicle shown to the right.
- Incident occurred in Nashville, TN -- May 31, 2016 around 17:30
- Tractor equipped with 2 Quantum Gen 3, 46 DGE strap mount Type 4 carbon composite CNG containers.



3-Peterbilt Tractor with Saddle Tanks

- Cylinder, straps, fiberglass boxes with steel bottoms supplied by Quantum.
- Cylinder system installed per Quantum instructions.
- No significant impact protection was provided—foam pads on tank ends were provided.



- About 330 miles into trip, truck ran over debris possibly a brake drum.
- Driver continued 15 miles to drop trailer...no indication of problem during walk around so driver proceeded to fuel.
- About 10 GGE into fill (at around 1030 psig), the right tank failed.
- Driver was standing on the right front tire to clean windshield...was thrown but not seriously injured.

3-Peterbilt Tractor with Saddle Tanks

- Front dome of tank was impacted by debris and tank appeared to fail at impact location. Other damage along tank may have also occurred from debris
- Tank was ripped from straps and propelled about 150 feet left of the truck.



3-Peterbilt Tractor with Saddle Tanks

- Heavily damaged the cab and sleeper.
- Little to no damage to the front end suspension, frame.
- No fire.



Lessons learned:

- This type of incident has occurred before—dating back 20 years.
- Effective training for drivers to perform more thorough inspections after a known impact and particularly before fueling—note that this driver did a cursory inspection—a full inspection is difficult with this tank package.
- OEMs should consider improved protection from debris impact by improved shielding and guards, more and better impact cushions.

- Driver, Technician and First Responder error causing an incident or escalating one—training is required.
 - Vehicle accidents or fires
 - Driving a vehicle with a brake dragging to the point of a fire starting
 - Not dropping an on fire load
 - Unsafe maintenance practices
 - Putting water on the PRD while attempting to cool a cylinder
- Vehicle non fuel system design issues such as:
 - Electrical short circuits/fires
 - Hydraulic system leaks
 - Poorly shielded hot surfaces (manifolds and cat converters)
 - Turbocharger oil leaks
- Vehicle fuel system design deficiencies such as:
 - Lack of safe defueling provision
 - PRDs that do not sense fire quickly enough
 - PRDs not vented to the safest location
 - Poor cylinder/fuel system installation or inspection practice
 - Should tanks (not PRDs) be insulated in areas of potential fire exposure
 - Cover external PRD openings in shields
 - Provide improved shielding/cushioning against impact

- All fuels have inherent risks and all vehicle types are subject to fire and other hazards.
- Industry must research and learn from incidents—then improve codes, vehicle and component design and training.
- Many incidents would be avoided or minimized by more effective training for maintenance staff, vehicle operators and First Responders.

- **NGV America: Advice to Owners of CNG Vehicles after Accidents**

<http://www.ngvamerica.org/media-center/technical-and-safety-documents/advice-to-owners-of-cng-vehicles-after-accidents/>

- **VOLUNTEER VOICE** with Robert Rielage: **Case study: What fire chiefs must know about CNG trucks-Following a near-miss, one department compiled 12 lessons learned for dealing with alternative-fueled commercial vehicle fires.**

<http://www.firerescue1.com/Firefighter-Training/articles/2870329-Case-study-What-fire-chiefs-must-know-about-CNG-trucks/>

Published in Rielage article—source was Indianapolis FD (paraphrased)

- Insist that the driver dump the load from the hopper.
- Position apparatus at an angle to the front corners of the garbage truck.
- If possible, confirm how long the hopper has been on fire.
- Attempts to extinguish the fire should only if there is access to the hopper.
- Attack should be unmanned if possible by deck gun or unmanned master stream.
- Secure a 500-yard area in all directions.
- Personnel behind apparatus to shield after critical functions completed.
- Tank cover will prohibit effective tank cooling if tanks exposed to direct flame.
- Department-wide training for CNG vehicles and unique dangers to responders.
- Update protocols involving CNG-propelled vehicles, especially vehicles with CNG tanks covered by steel. Cooling fuel tanks for fear of **BLEVE** may not work in these types of incident and can lead to serious injury or death.
- If risk of **BLEVE**, and the fire cannot be extinguished soon after the fire is started, evacuate area and prepare for exploding tanks and materials to shrapnel.
- Re-enforce need for thorough & complete 360-degree size-up when responding.

CNG does not BLEVE—spraying water on tanks could delay PRD activation.

Thank You!

Credit to John Gonzales (NREL) and Kyle Bowker (NHTSA) and John Dimmick for resources used in the presentation.

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