Snow and Ice Accumulation on Vehicles

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During the winter months in regions with significant snowfall, snow and ice accumulates on the tops of vehicles, which can then dislodge during travel. These chunks of snow and ice may strike other vehicles, creating a safety issue that results in property damage or injury to other motorists. The research objectives of this study included quantifying the scope of the problem, identifying potential solutions and developing a recommended action plan for highway safety stakeholders. ATRI conducted a thorough scan of existing literature, snow/ice removal products and regulatory actions relating to snow and ice safety issues. Stakeholder interviews and surveys were also conducted to better understand the technical and institutional challenges and potential solutions. The comprehensive review and synthesis of available research and information yielded little to no data on the scope of snow and ice accumulation on vehicles. The research findings discreetly document the myriad safety, financial, technical and institutional challenges associated with effectively addressing or mitigating the safety concerns associated with snow and ice falling from vehicles. To offer a comprehensive set of solutions, a list of actions for the short-, mid- and long-term are recommended in the research. Short-term actions include a public outreach and education campaign targeting operators of all vehicle types. A mid-term action is to further explore the feasibility of locating snow removal devices at public weigh stations and ports of entry. The recommended long-term action plan involves investigation of potential vehicle-based solutions which would prevent or impede snow and ice accumulation on vehicles.
BACKGROUND

The Trucking Industry
The trucking industry drives the U.S. economy, delivering 69 percent of the nation’s goods. In 2006, the industry represented a $645.6 billion industry, comprising over 83 percent of the nation’s freight bill (1). In addition, the U.S. trucking industry is one of the largest employers in the country, accounting for over 8.9 million industry-related jobs of which 3.46 million are truck drivers (1).

The trucking industry is extremely diverse; trucking company size ranges from an owner-operator with one truck to large carriers that operate thousands of trucks with dozens of terminals. Additionally, the industry consists of many sectors, each with very different operating environments. Though most fleets are comprised of van trailers, a sizable number of others are specialized carriers that utilize tanker trucks or flatbed trailers.

Throughout the industry, safety is a top concern for all stakeholders as evidenced by continued decreases in truck-involved crash rates. While economic growth in the U.S. has driven the number of miles traveled by large trucks to increase 16 percent from 1998 to 2007, the vehicle involvement rate for large trucks in fatal crashes has declined 47 percent (2).

Snow and Ice Accumulation on Vehicles – A Safety Concern
During the winter months in regions that experience significant snowfall, snow and ice accumulates on the tops of all vehicle types, including automobiles, straight trucks, intermodal containers, large trucks, trailers and buses. This accumulation of snow and ice potentially causes a significant safety issue as chunks of ice may form when accumulated snow melts, then refreezes. During transit, a piece of ice may dislodge from the vehicle, potentially damaging vehicle components, causing property damage to other vehicles and even injuring other motorists.

However, the size and weight of ice sheets that may dislodge from larger vehicles in transit create a more significant safety concern for the trucking industry. Operational impacts from accumulated snow and ice are also possible, including size and weight limit violations and lowered fuel economy.

Removing snow and ice from the tops of trailers creates a series of safety and operational challenges, documented in detail later in this report. What may be viewed as the simplest solution, to have workers or drivers climb onto a trailer roof and manually remove snow and ice by shoveling or raking the trailer roof, creates its own set of serious safety issues, including slips and falls from trailers. Other methods for snow and ice removal can be more complex, require routine maintenance, or be cost-prohibitive to a significant portion of the industry.

Routinely removing accumulated snow and ice can mitigate several safety-related risks including:

- Snow blowing off the trailer roof and impairing motorist visibility;
- Ice falling from a vehicle and causing injury or property damage to other motorists;
- Violations of snow and ice removal laws or fines for falling ice;
- Violations of other vehicle operations-related regulations.

Other benefits of routinely removing snow and ice accumulations are improved fuel economy (by reducing the weight of the accumulated snow and ice) and the reduction of
potential insurance claims or civil litigation resulting from falling ice. However, the
costs/benefits of routinely removing snow may be difficult to determine due to the fact that snow
frequently (and harmlessly) blows off the vehicle while in transit.

While the safety risks from snow and ice dislodging from large commercial vehicles have
been reported by the media, there is little empirical research on the scope of the problem,
potential solutions and their respective value for industry safety and operations.

RESEARCH APPROACH

At the request of several State Trucking Associations (STAs) and upon recommendation of its
Research Advisory Committee (RAC), the American Transportation Research Institute (ATRI)
initiated research in March 2008 to determine the scope of the problem, document current
industry practices and quantify for the industry potential solutions for mitigating the safety risks
of snow and ice falling from vehicles.

Specifically, the research objectives were to:

- Document the extent of the problem;
- Review current and proposed legislation targeted toward the problem;
- Identify snow and ice removal methods for trucks and trailers and evaluate the efficacy of
each;
- Recommend potential solutions for the industry.

In support of these objectives, the following tasks were initiated by ATRI:

1. Literature review of existing research;
2. Environmental scan of the current regulatory environment;
3. Documentation of the scope of the problem;
4. Development of a compendium of snow and ice removal tools, technologies and
practices;
5. Development of a recommended industry action plan.

The research design focused on soliciting industry input from stakeholders in North
America and Europe and included an online survey, internet searches, personal interviews and
solicitation of commercial driver input through ATRI’s biweekly XM Satellite Radio program.

Stakeholder groups contacted included:

- Motor carrier safety and operations personnel;
- Large shippers/receivers;
- Law enforcement;
- Motor carrier insurers;
- Safety advocacy groups;
- Truck tractor and trailer manufacturers;
- Trucking industry associations.
RESEARCH FINDINGS

Literature Review and Regulatory Environmental Scan

Strong concern for the potential safety issues created by the dislodgement of snow and ice from moving vehicles has been expressed by state legislators, law enforcement, the trucking industry and the motoring public. However, despite this concern and periodic publicity of high-profile incidents involving serious injuries and significant property damage, ATRI was unable to identify any research studies conducted on the issue of snow and ice dislodging from large commercial vehicles while in transit.

U.S. Federal Regulations

Currently in the U.S. there are no federal regulations specifically mandating the removal of snow or ice from a vehicle prior to transit. Additionally, there are no specific regulations in which a driver or motor carrier may be cited if snow or ice dislodges and causes injury or property damage to another motorist or pedestrian. In the absence of specific federal regulations, the research identified two areas where states are enforcing snow and ice removal:

- Law enforcement may cite drivers or motor carriers under several other commercial motor vehicle operation regulations; or
- Pursuing and/or enacting state or roadway-only legislation targeting any vehicle traveling with accumulated snow or ice or if snow or ice dislodges from a vehicle while in transit and causes property damage or injury.

State Regulations

The regulatory environmental scan identified five states with existing or proposed legislation related to snow and ice removal (Connecticut, Massachusetts, New Jersey, New York and Pennsylvania). However, the majority of states in the U.S. that experience substantial annual snowfall have enacted neither specific regulations requiring the removal of accumulated snow and ice prior to travel nor legislation to cite drivers for falling ice causing injury or property damage to other motorists or pedestrians.

Research indicates that many states as well as Canadian provinces do employ regulations covering the safe operation of commercial motor vehicles as a means for enforcing snow and ice removal from large trucks, often at the discretion of the investigating officer. For example, drivers or motor carriers may be cited for weight or height violations, operating a vehicle that is not in safe operating condition or in a manner that creates a potentially dangerous situation.

Canadian Regulations

In many ways, Canadian efforts to address this safety issue mirror those in the U.S., though some aspects are more progressive than the U.S. (likely due to the increased frequency and volume of snow and ice). For example, Canadian carriers may have agreements with distribution centers and other customers on who is responsible for removing snow and ice from “dropped” or staged trailers. Similarities shared by the two countries include:

- Stakeholders agree this is a serious safety problem;
- Some jurisdictions have specific legislation, while others do not;
Some jurisdictions rely on regulatory interpretation of cargo securement, safe motor vehicle operation and height/weight restrictions; Tolerance of some additional weight/height from accumulated snow and ice is sometimes allowed at the officer’s discretion.

Similar to the U.S. with no specific federal regulation, snow and ice removal from vehicles resides at the provincial level in Canada. The majority of Canadian provinces do not have specific regulations either requiring the removal of snow and ice from vehicles prior to operation, or provisions to cite a driver if snow or ice falls from a vehicle and causes injury or property damage. However, Quebec has a regulation explicitly prohibiting vehicle operators from allowing snow or ice to fall from their vehicle (3).

The European Experience

ATRI contacted several European governments and transportation stakeholder groups and the European Commission. Countries contacted included Sweden, Norway and Switzerland. All interviewees were unaware of specific legislation requiring snow and ice removal, though a representative of the Swedish National Road and Transport Research Institute (VTI) indicated that there is an awareness of the problem and that some motor carriers use truck washes to remove snow and ice (Claes Eriksson, unpublished data).

Similar to the U.S. and Canada, enforcement may broadly interpret general regulations governing the safe operations of vehicles. These regulations include the roadworthiness of a vehicle and cargo securement regulations. An interviewee from the Swedish Road Administration indicated that several civil cases have reinforced that motor carriers and drivers may be held liable if a piece of ice falls and causes injury or property damage (Soren Hedberg, unpublished data).

Another interviewee representing a heavy duty truck manufacturer indicated that while this is an issue in Europe, there appears to be no systematic approach for addressing snow and ice accumulation on large trucks (Skip Yeakel, unpublished data). Efforts to quantify the scope of the problem in Europe yielded similar findings for both the U.S. and Canada. A lack of quantifiable data on the frequency of events likely explains the lack of a systematic approach for addressing it. Anecdotal evidence alone may prove insufficient for enforcement, transportation agencies and private industry to devote significant resources and funding to solving this problem.

Worker Safety

One of the most commonly discussed issues surrounding snow and ice removal is worker/driver safety. Many outside the industry believe that the solution to mitigating this safety risk is for drivers or maintenance personnel to ascend to the top of the truck or trailer to remove the snow and ice. However, the hazards of requiring a driver or maintenance personnel to climb 13-feet in the air, often in icy or snowy conditions, to remove snow and ice from a trailer is a significant safety concern for truck drivers and motor carriers. In many cases, this practice violates federal or state worker safety guidelines.

The U.S. Occupational Safety and Health Administration (OSHA) issues guidelines protecting worker safety and has jurisdiction over facilities defined as “workplaces.” OSHA has issued guidelines for protecting workers from falls and dictates personal protection equipment (PPE) standards for workers using raised platforms or catwalks to remove snow or ice from trailers. This standard is applicable to employees that:
“… are working atop stock that is positioned inside of or contiguous to a building or other structure where the installation of fall protection is feasible (4).”

However, this standard is only applicable to locations where a fall protection system is feasible. Except in the above scenario:

“The current fall protection standard in general industry (Subpart D) does not specifically address fall hazards from the tops of rolling stock. The new proposed fall protection standard, 55 Fed. Reg. 13360, explicitly excludes rolling stock from coverage (5).”

Rolling stock (i.e. vehicles or trailers) is exempted from this standard due to the nature of trucking and the fact that drivers may have to inspect or perform duties on numerous types of trailers, including van trailers, tankers, grain-hoppers and others. However, the underlying basis of OSHA jurisdiction, the OSHA Act, contains a “General Duty Clause” that:

“requires an employer to provide employees with a workplace that is free from hazards that are recognized by the employer's industry and that are likely to cause death or serious physical harm (6).”

If OSHA is notified or an OSHA inspector witnesses a driver or any other employee at a company facility of climbing on top of a trailer without fall protection, the trucking company can be cited for violating the “General Duty Clause” of protecting workers from workplace hazards. Conversely, according to the American Trucking Associations, if the same behavior is reported or observed at a large distribution center, the distribution center can be cited for violating the clause (Christina Cullinan, unpublished data). Requiring drivers to clear snow and ice from a trailer top has other implications and would require motor carriers to verify an employee is physically able to perform the job function and has been trained to do so.

Lastly, it should be noted that OSHA guidelines are not enforceable on public roadways, public weigh stations or public rest areas. These areas are not considered a “workplace,” and are therefore outside of OSHA jurisdiction. If an OSHA inspector observed a driver climbing on top of a trailer to clear snow or ice at a public facility, neither the carrier nor the driver could be cited under OSHA guidelines. However, due to worker/driver safety concerns, most carriers strongly discourage employees from climbing tractors or trailers to clear accumulated snow and ice.

Similar to the U.S., there are Canadian worker safety guidelines that strongly discourage workers from climbing on top of trailers, a height greater than three meters, without a safety harness or restraint device (7).

Safety Impact Analysis

Through its environmental scan, ATRI identified that research and statistics to quantify the frequency of falling ice incidents, or the number of citations issued to drivers for snow- and ice-related issues is almost non-existent. Stakeholders with in-depth knowledge of a variety of safety-related data sources were contacted to discern the availability of data on the frequency or severity of incidents caused by falling ice or snow. Data sources vetted include:

- U.S. federal and state traffic accident and fatality data sources;
- Royal Canadian Mounted Police accident statistics;
Several state and provincial driver citation databases;

Insurance industry claim frequency and risk mitigation databases;

Motor carrier accident data;

European accident data.

**Frequency Analysis**

According to the U.S. National Highway Traffic Safety Administration (NHTSA), in 2006 there were approximately 116,000 traffic collisions in which snow or ice was present. Most involved property damage only (93,000); another 22,000 were crashes that involved injuries, while 463 crashes resulted in at least one fatality\(^8\). In 2007, large trucks were involved in 12,143 accidents when the weather included snow or blowing snow conditions and 19,222 accidents when there was snow, slush or ice on the roadway\(^2\). However, these data sources do not explicitly identify crashes that may be attributed to falling snow or ice.

**Media Reports**

As incidents involving ice dislodging from a truck occur, the stories are often covered by the local media. Oftentimes these news reports are the impetus for state legislatures to pursue tighter regulations mandating snow and ice removal from vehicles, or penalties for drivers operating a vehicle in which snow or ice falls and causes injury or property damage to another motorist. ATRI identified several articles anecdotally documenting the frequency of safety incidents involving snow and ice dislodging from vehicles\(^9,10,11\).

Other news articles offer insight into the scope of the problem of snow or ice falling from different types of vehicles. These articles recount instances of snow and ice falling from vehicles other than large trucks\(^12\) and how a single storm may cause several reports of falling ice from vehicles\(^13,14\).

**Motor Carrier Interviews**

U.S. and Canadian motor carriers representing a cross-section of the trucking industry were interviewed on the frequency of snow and ice issues, potential solutions and industry practice. Carriers interviewed included truckload (TL), less-than-truckload (LTL) and parcel/package carriers.

Motor carrier safety personnel were asked to provide details on the frequency and severity of these incidents. Of the 14 carriers contacted, none were aware of any incidents related to ice falling from one of their trucks, though one carrier indicated that a piece of ice had fallen from a pickup truck and caused extensive body damage to a company tractor. However, carriers did note that it is not uncommon for truck drivers involved in one of these incidents to be unaware that a piece of ice has fallen from their truck or trailer. None of the Canadian carriers contacted had experienced a major incident.

**Industry Survey**

To augment efforts to determine the scope of the problem and identify what solutions, if any, motor carriers are employing, ATRI developed and made available an online survey targeting motor carriers with operations in areas of snow and ice accumulation. The survey was distributed via the American Trucking Associations Technology and Maintenance Council (ATA TMC) and the ATA's Technical Advisory Group, a formal group of carrier members that collaborate with ATA staff on technical and engineering-related issues. In total, 57 motor
carriers, representing both the for-hire and private segments of the industry, responded to the survey.

Industry Survey Results

Less than half of the survey respondents (35%) indicated that snow or ice has fallen from one of their trucks or trailers causing injury or property damage to another motorist. Another 21 percent responded “not sure,” underscoring the fact that drivers, and thus motor carriers, frequently are unaware that a piece of ice has fallen while a vehicle is in-transit.

Of the 35 percent reporting that they had experienced snow or ice falling and causing injury or property damage, 65 percent indicated that the incident resulted in an insurance claim. Only one respondent indicated that falling snow and ice resulted in litigation. The high incident rates of respondents experiencing falling ice that causes injury or property damage which resulted in an insurance claim may indicate that carriers with past experience were more likely to complete the online survey.

Liability Issues

Research indicates that at least one civil case resulted from falling ice. This case was prompted when a motorist was injured by a dislodged piece of ice from a truck while in transit and was filed on the basis that the driver was liable for not performing a sufficient driver vehicle inspection report (DVIR) (15). Plaintiffs contended that the driver was negligent in performing the DVIR for not inspecting the roof of the trailer for accumulated ice, even though ice was not observed hanging from top or sides of the trailer.

The investigating officer, a Pennsylvania State Trooper, issued two citations; one to the motor carrier for “systematically maintaining a vehicle with snow and ice on the top of the trailer in violation of the Federal Motor Carrier Safety Regulations (FMCSR) and another to the truck driver for the failure to secure a load. (75 Pa.C.S.A. 4107(b)(2)).”

An expert witness contended that the driver violated FMCSR Section 396.13 and that, given the weather conditions, was negligent for not inspecting the top of the trailer for ice. Additionally, the expert witness suggested that the motor carrier should have provided a ladder, or some other means, for the driver to inspect the trailer roof. The court found it was not reasonable, nor was it industry practice, for drivers to inspect trailer roofs for ice accumulation, even though environmental conditions may exist that favor the formation of ice. Both the carrier and the driver were absolved of any negligence or liability.

Motor Carrier Insurers

Several major insurance carriers were contacted to provide insights into the scope of the problem. ATRI requested data on the frequency of insurance claims for truck damage caused by falling ice as well as the frequency and amounts of insurance settlements for motorists suffering injury or property damage from falling ice. All interviewees indicated that insurance claims are not coded in such a way as to make this information available. One interviewee from a large insurer could not recall any large claims arising from a severe incident involving falling snow or ice (Dave Melton, unpublished data).

Premium Reductions

Some snow removal device vendors suggest in marketing materials that the installation and use of snow removal devices might result in lower insurance premiums for motor carriers. One
insurance industry interviewee indicated that this is not the case. No premium discounts are associated with installation of snow removal devices due to the inability to ensure that the devices are consistently and appropriately used in every situation that may pose a risk (Wellington Roemer III, unpublished data). Rather insurers note that if snow removal devices and practices reduce claims, then lower premiums will result.

**Snow and Ice Removal Solutions**

Though the risk of falling snow and ice is well recognized, there remains a lack of economically feasible, easily deployable solutions available to motor carriers. However, the industry survey does indicate that some carriers have either purchased or built devices or are using other approaches (see Table 1).

**Snow Removal Devices Used – Survey Results**

Forty-one percent of respondents listed at least one type of snow removal device used, consistent with the percentage of respondents that answered that they removed snow and ice sometimes or often (47%). Of these respondents, nearly two-thirds (61%) listed the use of one device, while another 39 percent listed the use of multiple devices for snow removal.

Drive-through scrapers were the most commonly used device, followed by some type of platform, truck washes and private contractors. Open ended responses listed under “Other” included a shop door opening and “shovel and elbow grease.” Of the drive-through scrapers, about half were purchased and half were built in-house. Of the platforms, two-thirds were built in-house, while the remaining were purchased. The majority of respondents ranked the top three devices utilized as doing a “fair” job of removing snow and ice. As part of the research, ATRI documented user perceptions of individual system advantages and disadvantages in a compendium of snow removal devices (16).

**TABLE 1 Use of Snow Removal Devices**

<table>
<thead>
<tr>
<th>Device Type</th>
<th>Percent of Total Devices in Use</th>
<th>Percent of Devices at Company Facilities</th>
<th>Poor</th>
<th>Fair</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive-Thru Scraper</td>
<td>47%</td>
<td>100%</td>
<td>6%</td>
<td>65%</td>
<td>18%</td>
</tr>
<tr>
<td>Drive-By Platform (catwalk) or Mobile Lift (Skyjack)</td>
<td>17%</td>
<td>80%</td>
<td>67%</td>
<td>33%</td>
<td></td>
</tr>
<tr>
<td>Truck Wash</td>
<td>14%</td>
<td>50%</td>
<td>20%</td>
<td>80%</td>
<td></td>
</tr>
<tr>
<td>Private Contractor</td>
<td>8%</td>
<td>n/a</td>
<td>33%</td>
<td>67%</td>
<td></td>
</tr>
<tr>
<td>Other *</td>
<td>14%</td>
<td>n/a</td>
<td>20%</td>
<td>20%</td>
<td>40%</td>
</tr>
</tbody>
</table>

* Does not total to 100% as not all respondents ranked system performance.

**Vehicle-Based Solutions**

Interviewees also identified other potential vehicle-based solutions including:

- Redesigned trailer tops that minimize the thickness, size or likelihood of ice formation;
- Improved trailer aerodynamics that reduce the likelihood of falling ice;
• The use of emerging truck technologies such as ambient temperature sensors to warn
drivers or motor carriers of the likelihood of ice formation.

Deicing
ATRI also investigated the use of deicing in the aviation industry to determine applicability for
commercial trucks. The use of deicing for commercial vehicles does not present a viable
solution for several reasons:

• The properties of the chemicals needed are vastly different between aircraft and trailer
tops.
• The stringent environmental standards which govern the use of deicing chemicals do
not make their use practical for the hundreds of thousands of trucks traveling in snowy
conditions on any given day.

Industry Practice
The industry survey queried respondents on the frequency of snow and ice removal from the tops
of trailers. Over half of motor carrier survey respondents (54%) never or rarely remove
accumulated snow or ice. However, over a third of these respondents indicated that they are
aware of existing legislation or new efforts to mandate the removal of snow and ice. Virtually all
respondents who indicated that their companies never or rarely remove snow or ice had no driver
training or snow and ice removal policies. These results may reflect several possible underlying
factors:

• The lack of available snow removal devices;
• A lack of empirical evidence has stymied stakeholder efforts to address the problem in a
comprehensive approach.

Of those respondents that often or sometimes remove snow or ice, 42 percent remove
snow often while the remaining 58 percent remove snow sometimes. Of this group, half do not
have policies or training for drivers – suggesting these companies may have an informal
intracompany understanding of the need for snow removal, though policies and procedures are
not fully integrated with core fleet operations (see Table 2).

Lastly, half of the respondents that remove snow and ice often or sometimes were
unaware of existing or pending legislation – suggesting these practices were based solely on
improving safety and mitigating safety risks. When looking at survey respondents in total,
nearly three-quarters (74%) do not have policies or training requiring drivers to remove snow or
ice.

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
<th>Not Sure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Snow and ice removal polices for drivers?</td>
<td>19%</td>
<td>74%</td>
<td>7%</td>
</tr>
<tr>
<td>Arrangements with customers for dropped trailers?</td>
<td>2%</td>
<td>88%</td>
<td>11%</td>
</tr>
</tbody>
</table>

Canadian carriers interviewed report that, prior to travel, various countermeasures are
utilized (with varying degrees of success), including:
• Use of the company truck wash;
• Mechanics use long handled squeegee-type devices to push snow off the tops of trailers;
• 3rd party contractors are used to clear snow and ice, typically at a cost of approximately $50-$150 per truck (which can create delays for the drivers of several hours);
• Use of snow removal systems.

These practices, however, only deal with the trailer as it leaves the company facility and do not address snow and ice removal while in transit. Another commonality among Canadian interviewees was the incorporation of snow and ice removal, and the hazards of falling ice, into several core fleet operational areas including:

• Driver training programs;
• Procedures for removing snow and ice from trailers at company terminals;
• Dispatching/procedural guidelines for drivers picking up trailers with accumulated snow and ice;
• The development of internal and private contractor networks to maximize the availability of snow removal options;
• Driver disciplinary procedures for traveling with accumulated snow and ice on company vehicles or trailers.

Trucking Industry Customers – Shippers, Consignees and Distribution Centers
The research identified few trucking industry customers with snow and ice removal devices or procedures in use at shipping and receiving locations. Just one survey respondent indicated having an agreement with a customer to remove snow and ice from dropped trailers. Carrier interviewees indicate that most of their customers consider accumulated snow and ice on trailers as the carrier’s problem, namely because it is the carrier’s equipment. Interviewees note that third-party contractors are most often used to clear snow and ice from trailers dropped at customer locations, at the carrier’s expense. Lastly, interviewees note that there is a reluctance to press their customers for snow removal devices at distribution centers, namely due to capital and maintenance costs, and the concern that these customers will simply turn to the carrier’s competitors for freight services. However, one snow removal device vendor lists several distribution centers in the northeast United States as customers. As another example, one “home-made” device is located in the regional logistics center for a major hardware chain store.

Truckstops and Rest Areas
NATSO, a national trade association representing travel plazas and truckstops, indicates that many truckstops operated by their members have truck washes that can be used to remove snow, but very few offer any other type of fixed location snow removal devices (Stephen Beaulieu, unpublished data). In addition, there is anecdotal evidence of a very small number of truckstops that offer other types of snow removal devices and typically charge $10-$30 per trailer. These facilities may play a role in developing a comprehensive network of snow removal options for motor carriers. ATRI did not find any evidence to indicate any type of snow removal devices located at traveler rest areas in the U.S., Canada or Europe.
THE CHALLENGES FOR SNOW AND ICE REMOVAL

The findings from the literature review, environmental scan, industry survey and interviews all serve to highlight the challenges associated with effectively dealing with or mitigating the safety concerns associated with snow and ice falling from large trucks.

Nature of Trucking

Freight transportation, and in particular trucking, is a 24/7 operation. However, federal rules regulate the number of hours drivers can work and drive, which means that at any given point in the day drivers will be parked for their required hours of rest. This provides an opportunity for snow and ice to accumulate on the top of trailers.

Furthermore, drivers often wait to pick up and deliver freight at customer locations or drop a trailer and pick up a trailer that has been sitting at the customer’s facility, again providing opportunities for snow and ice to accumulate on top of the vehicle. Drivers who operate across the U.S./Canadian border also experience long waits to navigate through the various customs and inspection facilities, which in winter months very likely means waiting in snow and ice, again allowing accumulation.

Identifying viable solutions which address the countless areas where drivers could experience an accumulation of snow and ice is perhaps one of the biggest challenges. Essentially, wherever it snows presents an area where snow and ice could accumulate on the top of large trucks.

Worker Hazards

Although drivers or other personnel present one of the lowest cost options for snow and ice removal, they also represent one of the most dangerous options. The tops of trailers are not designed to withstand the weight of a driver on top to clean the accumulated snow and ice. Furthermore, the potential for slips, falls and even death associated with individuals attempting to get to the tops of trailers covered in snow and ice to clean the trailer top far outweigh any potential benefits from this as a solution. The hazards for workers are recognized and in many cases regulated by agencies responsible for worker safety.

The use of platforms and catwalks helps mitigate the risk somewhat by providing safety harnesses for workers, but do not completely eliminate the hazards from the snow and ice. As documented through the interviews, the platforms and catwalks provide a fixed location solution for snow removal but removing ice is more difficult when it bonds to the trailer top.

Availability of Snow and Ice Removal Devices

There are several devices for snow and ice removal currently available, with patents pending and production forthcoming for additional devices. However, with the exception of one, the current devices all have limitations in terms of removing ice. The other, a Snow Thrower, is purported to do well in removing snow and ice, but has capital costs of over $70,000, making its viability as a widespread solution extremely limited.

The other issue with fixed location devices, regardless of their efficacy in removing snow and ice, is that they only provide a solution for trucks with access to those locations. Given the 24/7, highly mobile nature of trucking, any widespread solution would likewise need to be available 24/7 to the majority of trucks operating in snow-prone areas.
Vehicle-Based Solutions

Vehicle-based solutions proposed by interviewees generally focus on redesigning trailers to impede the formation of ice sheets and/or improved trailer aerodynamics which would reduce the likelihood of ice falling from the trailer.

Contact with the trailer manufacturer industry group indicates an awareness of the potential safety issues related to snow and ice falling from trailers. However, staff from the Truck Trailer Manufacturers Association (TTMA) reported that TTMA members are unaware of any requests from customers to develop a solution. Additionally, the organization reports that there are no engineering or aerodynamic redesign efforts underway to mitigate the accumulation of ice or snow on truck trailers (Jeff Sims, unpublished data).

The challenge for a vehicle-based solution is the time horizon associated with fleets turning over their trailer fleet. Even if a redesigned trailer were engineered, tested, and on the market within 3-5 years, it would still be another 10-15 years before the majority of the existing trailer fleet were replaced, making a vehicle-based solution a more long-term proposition.

INDUSTRY ACTION PLAN

Challenges exist but the research has identified some potential action items which, when jointly undertaken by both private and public sector partners, may reduce the safety impacts from snow and ice falling from vehicles. The following outlines proposed actions for the short-, mid- and long-term.

Short-Term
The short-term proposals focus on outreach and education on the issue for all motorists and on exploring the potential for documenting a network of available snow removal devices.

In 2002, the Commercial Vehicle Safety Alliance (CVSA) developed and distributed a pamphlet detailing the problem and solutions for removing accumulated snow and ice from commercial motor vehicles (17). Among the recommendations are for drivers to:

- Anticipate inclement weather and load the vehicle to allow for extra weight accumulation;
- Carry appropriate equipment during the winter months to help remove the accumulation of snow and ice;
- Remove ice and snow when at a safe location, such as a truck stop or rest area;
- Check load weights before ice and snow accumulate.

A revised outreach campaign could be developed which expanded on the original CVSA information by providing a compendium of available snow and ice removal devices and their location. A similar approach was initiated by the Ontario Trucking Association (OTA), with some challenges noted below (Stephen Laskowski, unpublished data).

In recognition of the safety risks inherent in snow and ice accumulation on large trucks, OTA has solicited participation from several stakeholder groups to make snow and ice removal devices available to all truck drivers operating throughout the province. Outreach efforts have targeted carrier members, the provincial government and trucking-related groups that include large shippers and distribution centers.
The OTA indicates that there are no snow/ice removal devices at public facilities, like weigh stations or rest stops, or private facilities like truckstops. Several association members own and operate snow removal devices, typically accessible to company drivers only. The more commonly used devices include brush removal devices, snow and ice scrapers and truck washes. Lastly, the OTA has found that there are very few devices located at trucking industry customer locations such as distribution centers or large shippers.

Due to the lack of snow removal devices, the OTA promoted an initiative to develop and publicize a network of member-owned snow removal devices located throughout the province. The plan called for a compendium of devices, available via the internet that provided device location, cost to use (if any) and hours of operation.

However, development of the compendium stalled due to several concerns among member carriers including:

- Worker safety issues;
- Device maintenance costs and snow removal costs;
- Vehicle damage liability issues;
- Facility security-related issues and 24-hour availability;
- Violation of Customs-Trade Partnership Against Terrorism (C-TPAT) security/secure facility provisions;
- Potential safety issues with trucks waiting to use the device.

Though the OTA’s vision of a network of snow removal devices has not yet materialized, the OTA continues to seek solutions to mitigate this safety risk and advocate a comprehensive solution available to all trucks traveling in Ontario.

In the U.S., the American Trucking Associations (ATA) could convene a stakeholder working group to explore the potential for a similar compendium, combined with an outreach and education component for all vehicle drivers, carriers, law enforcement, truckstop operators, distribution centers and others. Potential members for the stakeholder working group include:

- ATA
- American Automobile Association (AAA)
- CVSA
- State Trucking Associations
- NATSO
- FMCSA
- National Industrial Transportation League (NITL)

In addition, this stakeholder working group could begin identifying the requirements for the development of future data collection activities and mechanisms. A possible starting point could be the data collected in states that have enacted snow and ice removal regulations. Issues that would need to be addressed would include:

- Types and format of data that could be collected from motor carriers, insurers and enforcement agencies;
- Housing/maintaining a centralized database;
• Defining how the data would be used to improve safety.

Mid-Term

One area regularly frequented by large numbers of trucks is state weigh stations and ports of entry. A mid-term solution would be to explore the possibility of installing snow removal devices at these facilities for use by all trucks passing through. This public sector approach has been implemented in the Canadian provinces of New Brunswick and Nova Scotia, where fixed snow removal devices are available at public weigh stations.

New Brunswick makes snow removal devices available at seven fixed, public weigh stations. If the weigh station is open, the scale operator may require a truck driver to clear snow and ice, or the driver may use the device voluntarily. The device consists of a platform/scaffolding which a driver uses to manually scrape off snow with a long-handled, heavy-duty scraper/squeegee, which the province has custom made.

Transportation officials report these devices are more effective at removing snow than ice (Nancy Lynch, unpublished data). Officials indicate the cost of removing piles of snow near the devices are minimal and are included in the costs of using snowplows to clear the parking lot and access/egress ramps. Lastly, there is anecdotal evidence that, since these facilities are open year round, the catwalks are also used by drivers with flatbed or logging trailers to check the security of their loads while in transit. The safety features, including the safety harness, appear to be adequate as no safety incidents have been reported (Diane Nash, unpublished data).

New Brunswick DOT personnel indicate that the platforms, though low tech, have worked well and believe that the availability of these devices to all truckers have reduced snow and ice falling incidents. In addition, interviewees indicate that these devices have required little, if any, maintenance (Nancy Lynch, unpublished data).

Based on the success of this model in New Brunswick, Nova Scotia purchased two fixed scrapers. One scraper is located in Amherst, while the other is located outside of Halifax. The devices are available to all trucks passing through the weigh stations.

Interviews with transportation industry professionals from these provinces indicate that these devices work well at removing snow and that there has been no reported safety problems associated with the operation of these devices.

The lack of proliferation of these devices across other Canadian provinces may be explained by three factors:

1) Cost of installation – ranging from $12,000 for “catwalks” to $18,000 or more for fixed scrapers;
2) Concerns over the ongoing costs associated with removal of snow that accumulates as the trailers are cleared;
3) Potential provincial liability for falls or injury from drivers falling from the platform or damage to vehicle equipment.

This mid-term solution clearly has associated costs, both capital costs for purchase and installation of the devices and ongoing maintenance and snow removal costs. However, it should be noted that the availability of the devices at public weigh stations should not be used as an opportunity to ticket drivers for overweight violations resulting from the accumulated snow and
ice. Instead, the installation of devices at public sector facilities should provide a proactive
safety solution by allowing drivers to clear the snow and ice prior to being weighed.

One recent state bill dedicates fines for failing to remove snow and ice to purchase snow
removal equipment in public locations (18).

An industry working group comprised of motor carrier associations, law enforcement and
state Departments of Transportation could collaborate to explore the viability of this potential
solution.

Long-Term
Perhaps the greatest potential exists in vehicle-based solutions; redesigned trailers which impede
the formation of ice sheets or lessen the potential for falling ice would eliminate the challenges
with the 24/7, highly mobile nature of the trucking industry. The newer trailers would also
eliminate the hazards associated with drivers or other personnel cleaning trailer tops.

However, given that the average trailer life is 10-15 years, widespread deployment of the
redesigned trailers as the national trailer fleet turns over makes this solution a long-term
proposal.

As a first step, a joint meeting with trailer manufacturers and motor carriers should be
held to reach an understanding on the issue and explore potential solutions.
REFERENCES


3. Quebec Highway Safety Code, Section 498 (amended)


