TSSA PUBLIC SAFETY REPORT 2022

Technical Standards and Safety Authority (TSSA) delivers public safety services on behalf of the Government of Ontario in the following key sectors:

1) Boilers and Pressure Vessels and Operating Engineers
2) Elevating Devices (Elevators, Escalators and Ski Lifts) and Amusement Devices
3) Fuels

TSSA enforces the *Technical Standards and Safety Act, 2000* (the Act) and its associated regulations.

Refer to www.tssa.org for further information on TSSA.
Refer to www.ontario.ca/laws/statute/00t16 for the Act.

ACKNOWLEDGEMENTS

TSSA would like to express gratitude to its inspectors and engineers for collecting and documenting valuable pieces of information and data - through their inspections, investigations and engineering services - that has been instrumental in developing this report, as well as its Information Technology team for providing the tools and advice for extracting data. TSSA would like to especially acknowledge the Public Safety Risk Management team of the Strategic Analytics Department for developing this report.

TSSA would also like to acknowledge Safety and Risk Officer Angela Byrne, CPA, CMA, for her ongoing advice and independent review of the report.

Finally, TSSA would like to thank its partners in industry, government, advisory councils and the public, who help keep Ontarians safe.

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Message from Viola Dessanti, Director, Strategic Analytics

On behalf of the Technical Standards and Safety Authority, I am pleased to present this year's edition of the Public Safety Report for the period of May 1, 2021, to April 30, 2022.

Public safety has remained stable over this past year across all program areas, as measured by our key safety performance indicators – incidents, injuries and observed injury burden.

While there have been slight increases in incidents and injuries, these are still below 10-year averages. After a very unusual fiscal year 2021 (FY21), with so many industries facing lockdowns and closures due to the pandemic, we expected to see some increases in key metrics once the province's commercial, industrial and retail activities resumed to pre-pandemic levels.

In FY22, there were five per cent more incidents and 129 per cent more injuries reported to TSSA across all program areas, compared to FY21. This is 16 per cent lower than the 10-year average for incidents and 22 per cent lower than the 10-year average for injuries.

In this report, we present key safety performance indicators for Ontario overall, as well as for each of the program areas that TSSA regulates: boilers and pressure vessels and operating engineers; elevating devices, escalators, amusement devices and ski lifts; and the transmission and distribution of fuels, specifically propane and liquid fuels. The analysis provided is based on data collected from incident reports, inspection activities, and risk assessments performed by TSSA subject-matter experts.

Through the insights highlighted and the case studies, we share details of real incidents reported to TSSA that illustrate key lessons for industry and the public and that outline TSSA's unique role in supporting and enabling public safety through education, engagement, inspections and enforcement.

Outcome-Based Regulator Transformation

TSSA continues to use risk and outcome analytics to focus its regulatory priorities. There have been a number of outcome-based initiatives with early positive results. I would like to highlight the following:

- Starting in May 2021, TSSA implemented a lapsed authorization program to ensure that regulated entities renew their authorizations in a timely way and are not operating without a valid licence. Since the program launch, 94 per cent of authorizations that lapsed have been resolved.

- Since the launch of the Compliance Support Program in 2019, 160 high-risk owners and contractors have received free education and engagement to address their specific areas of risk. Of those, 87 per cent have seen a reduction in their overall risk scores.

These early results are promising. We will continue to monitor data and analyze trends to better understand how we can continue to leverage risk analytics and reporting to achieve our goal to create a safer Ontario and reduce public harm.

Finally, I would like to acknowledge that this past year we asked key readers of the Public Safety Report for their feedback and input on the clarity of the report. The feedback we received was instrumental to improve how we present this information so that it is as impactful and insightful as possible. As a result of that feedback, we have changed the format of the report, making the content more consistent, easy to find and understand in plain language, and adding more contextual analysis.

I hope that you find the Public Safety Report useful as you endeavour to enhance your own safety practices.

Viola Dessanti
Director, Strategic Analytics

About Us

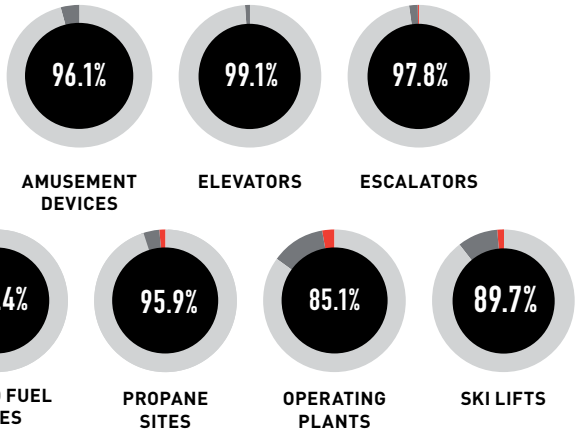
The Technical Standards and Safety Authority (TSSA) is Ontario's public safety regulator, mandated by the Government of Ontario to enforce technical safety regulations and enhance public safety.

Throughout Ontario, TSSA regulates the safety of amusement devices, boilers and pressure vessels, elevating devices, fuels, operating engineers, and ski lifts.

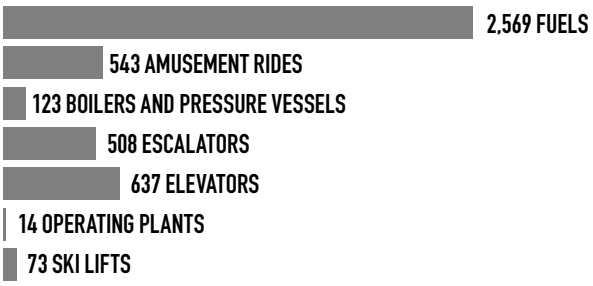
TSSA's range of safety services includes public education and consumer information, examination, certification, licensing and registration, engineering design review, data analytics, risk evaluation, standards development, inspections, investigations, safety management consultation, compliance support, and enforcement and prosecution activities. TSSA also provides limited non-regulatory services through contracts to organizations in Ontario, mainly in the nuclear industry.

90.8% OF DEVICES AND SITES INSPECTED BY TSSA ARE CONSIDERED **LOW RISK**

Percentage of Devices and Sites Considered Low Risk*



Incidents (FY22)



Permanent Injuries (FY22)

AMUSEMENT RIDES	8
BOILERS AND PRESSURE VESSELS	0
ELEVATORS	7
ESCALATORS	1
FUELS	10
OPERATING PLANTS	0
SKI LIFTS	3

Fatalities (FY22)

2 Fuel-Related FATALITIES

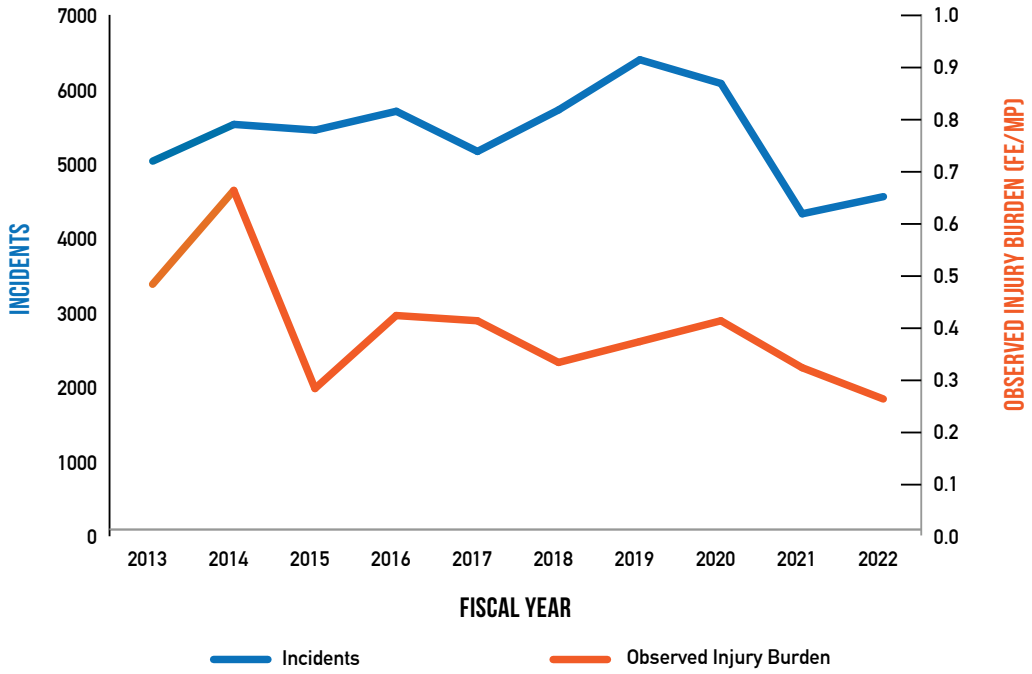
*Red indicates the percentage of high-risk devices and sites.

State of Public Safety in Ontario

All Programs Combined

SUMMARY OF SAFETY NUMBERS				
REPORTING PERIOD	INCIDENTS	NON-PERMANENT INJURIES	PERMANENT INJURIES	FATALITIES
10-year Average	5,319	1,255	49	4
2022	4,467	983	29	2

Figure 1: 10-Year Safety Trends for All Programs



The overall state of safety has remained stable this past year.

As the province reopened this past year, there has been an increase in all key indicators compared to last fiscal year - specifically, an increase from 441 to 1,012 (129 per cent) in injuries and an increase from 4,246 to 4,467 (5 per cent) in incidents.

We attribute the increase this year to the reopening of most commercial, retail and industrial activities after pandemic-related lockdowns. In other words, FY21 was an outlier.

Yet, these results are still lower than the 10-year average for all measures.

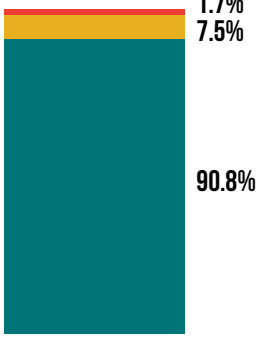
In FY22, there are 22 per cent fewer injuries and 16 per cent fewer incidents than the 10-year average.

The overall health impact of TSSA-regulated technologies – measured in the relative severity of injuries and fatalities reported to TSSA – remains low – 0.25FE/mp – compared to the 10-year average – 0.38FE/mp.

This suggests that there are fewer people getting hurt.

HEALTH IMPACT			
OBSERVED		POTENTIAL	
0.38 FE/mp (10-year Average) Injury Burden	**0.25 FE/mp** (2022) Injury Burden	**0.32 FE/mpy** (2022) Risk of Injury or Fatality	**0.40 FE/mpy** (2021) Risk of Injury or Fatality

INVENTORY RISK PROFILE 2022

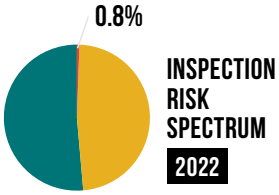


192 (1.7 per cent) of TSSA-regulated devices and sites are considered high risk compared to FY21.

High-risk devices and sites are inspected more frequently, which is supported through TSSA's Compliance Support Program. In FY22, 7.5 per cent and 90.8 per cent of the devices and sites were deemed medium and low risk respectively; compared to 8.9 per cent and 89.2 per cent, respectively, last fiscal year.

2018 - 2022 FIVE-YEAR AVERAGE PERCENTAGE COMPLIANCE

28.0%



INSPECTION RISK SPECTRUM 2022

In FY22, 0.8 per cent of non-compliances found/identified during inspections were high risk compared to 0.3 per cent last fiscal year.

More than half (51.2 per cent) of the inspections were found to be low risk this year compared to 47.9 per cent last fiscal year.

GREEN LOW RISK

Green indicates safety issues that are low risk and require periodic inspection.

YELLOW MEDIUM RISK

Yellow indicates minor safety issues that are medium risk and require enhanced monitoring.

RED HIGH RISK

Red indicates major safety issues that are high risk and require an actionable response.

Amusement Devices

TSSA's Amusement Devices Safety Program regulates the devices designed to entertain thrill seekers, including roller coasters, Ferris wheels, merry-go-rounds, water slides, go-karts, bumper cars, inflatables, bungee devices and zip lines.

Before a new amusement device is registered, TSSA reviews engineering designs to ensure compliance with Ontario's safety requirements. TSSA licenses amusement rides and operators and issues certificates to qualified mechanics. TSSA also issues permits for rides each year the rides are in operation.

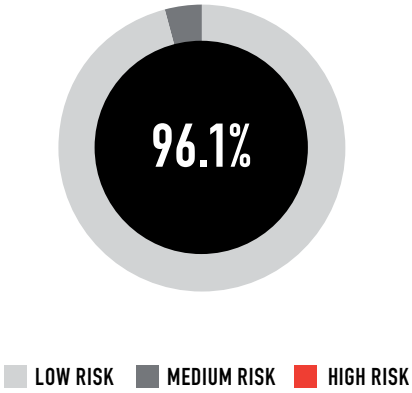
TSSA inspects new devices prior to their start up and again at the start of every new season. When necessary, TSSA also conducts investigations.

Number of Devices

4,382

DEVICES

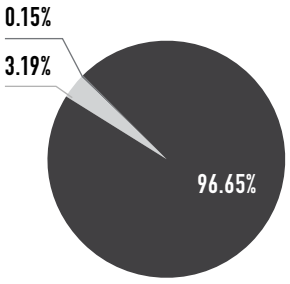
Low-Risk Devices



Incidents (FY22)

0	8	527
FATALITIES	PERMANENT INJURIES	NON-PERMANENT INJURIES

543 TOTAL INCIDENTS



Root Cause of Incidents (FY22)

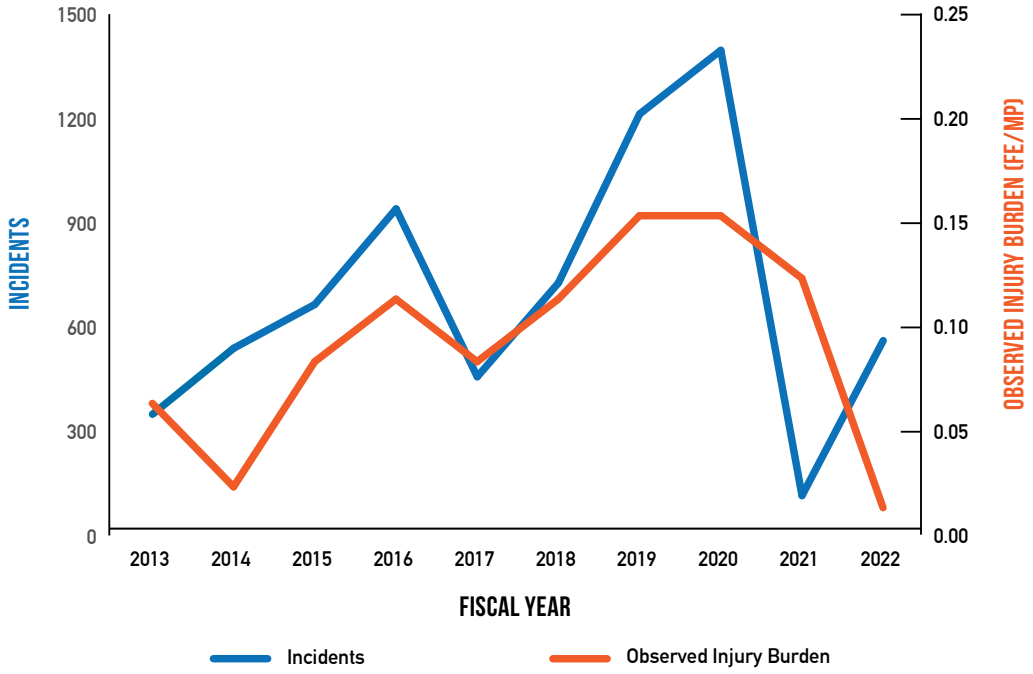
- NON-COMPLIANCE
- ROOT CAUSE NOT ESTABLISHED
- POTENTIAL GAPS IN REGULATORY SYSTEM
- EXTERNAL FACTORS

State of Public Safety in Ontario

Amusement Devices Safety Program

SUMMARY OF SAFETY NUMBERS				
REPORTING PERIOD	INCIDENTS	NON-PERMANENT INJURIES	PERMANENT INJURIES	FATALITIES
10-year average	678	619	22	0
2022	543	527	8	0
INCIDENTS CURRENTLY UNDER REVIEW				
REPORTING PERIOD	INCIDENTS	NON-PERMANENT INJURIES	PERMANENT INJURIES	FATALITIES
2022	2	2	0	0
2020	2	0	0	0
2019	2	0	0	0

Figure 13: 10-Year Safety Trends for Amusement Devices



Since the beginning of 2020 and for the past two fiscal years, fewer amusement device incidents have been reported to TSSA. Between FY21 and FY22, there was an average of 320 incidents, a decrease compared to the previous 10-year average of 678. TSSA attributes the decline almost entirely to COVID-19-related closures and restrictions which meant fewer devices were in operation.

In FY22, 543 incidents were reported, including eight permanent injuries and 527 non-permanent injuries. While this is still a 20 per cent reduction compared to the 10-year average, it is higher than FY21.

The Observed Injury Burden (OIB) is reported based on the severity of injuries in that year. The OIB is the measure in fatality equivalent (FE) observed each year and normalized by the population of Ontario (FE/mp).

Figure 13 shows that the OIB for amusement devices spiked in FY19 – this was due to a fatality reported in the program area. At 2:20 a.m., a man broke into a facility while the facility was closed and used queue ropes and an accessibility kit to connect himself onto a zipline. His actions ended in tragedy.

The OIB for FY22 was 0.01FE/mp. This means that most of the injuries reported have a very low severity (for example scrapes, bumps, scratches, etc.).

The OIB for this fiscal year continues to be lower than the 10-year average (0.09 FE/mp) primarily due to the decrease in incidents and injuries during the pandemic. Since the decrease in incidents primarily affected FY21 and FY22, the 10-year average for OIB for the next two to three years will be lower due to fewer incidents having happened during this timeframe.

TOP SAFETY ISSUES FY22		
DEVICE TYPE	BY INCIDENTS	BY OBSERVED INJURY BURDEN
Amusement Rides	50.35%	38.00%
Water Slides	31.14%	24.80%
Zip Lines	14.05%	20.35%

Over 97 per cent of FY22 amusement device incidents are related to external factors[2] that fall under the "Failure to follow user instructions" clause of 7.6. Some of these incidents included the following:

1. Customers falling while getting off a stationary ride
2. Customers complaining of nausea, headaches and lower/upper backpain after completing a ride
3. Customers grabbing a zipline cable while riding across the zipline

HEALTH IMPACT			
OBSERVED		POTENTIAL	
0.09 FE/mp (10-year Average) Injury Burden	**0.01 FE/mp** (2022) Injury Burden	**0.07 FE/mpy** (2022) Risk of Injury or Fatality	**0.09 FE/mpy** (2021) Risk of Injury or Fatality

TSSA's RIF estimates the potential for injury or fatality by analyzing reported 10-year incident data and performing a Monte Carlo[1] simulation. This provides a value that represents the potential of injuries based on past performance. The RIF for amusement devices was the same in FY22 and FY21.

[1] J.E Gentle. "Computational Statistics." In International Encyclopedia of education, third edition (2010): 93-97.

[2] Refer Appendix K - Glossary of terms

Risk Profile of Regulated Entities

TSSA estimates the relative risk of the amusement devices it regulates by analyzing the data collected during inspection activities. Orders issued at a periodic inspection are risk assessed, and the regulated parties are given a specific amount of time to comply with safety orders based on the relative exposure that is tolerable for the potential hazard if the order's safety issue is not corrected on time. Based on this risk score, TSSA estimates that there was only one high-risk amusement device in Ontario in FY22.

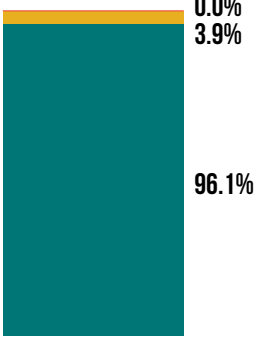
Of the 1,266 periodic inspections conducted in FY22, 6.3 per cent found high risk non-compliances – this is a 4.5 per cent increase from 1.8 per cent last fiscal year. This could be attributed to the fact that fewer inspections were performed in FY21.

There were 23 operational inspections conducted in FY22, and no high-risk non-compliances were found (there were no high-risk non-compliances found in FY21 either).

The most common high-risk issues found during inspections (periodic and operational) were tie downs and anchors not being in place for inflatable amusement devices.

The majority of safety issues were failures to tie down inflatables and failures to keep training records. These safety issues were seen most often last fiscal year, as well.

INVENTORY RISK PROFILE 2022



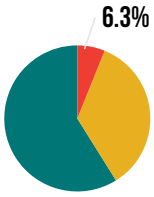
There was only one high-risk device – an amusement ride – in FY22, compared to two high-risk devices last fiscal year.

Over 96 per cent of the qualified provincial inventory is low risk.

2018 - 2022 FIVE-YEAR AVERAGE

52.9%

PERCENTAGE COMPLIANCE



INSPECTION RISK SPECTRUM 2022

GREEN
LOW RISK

Green indicates safety issues that are low risk and require periodic inspection.

YELLOW
MEDIUM RISK

Yellow indicates minor safety issues that are medium risk and require enhanced monitoring.

RED
HIGH RISK

Red indicates major safety issues that are high risk and require an actionable response.

Refer to Appendix D for further information on amusement devices.

Message from Roger Neate, Amusement Devices Statutory Director

This past year was once again challenging for the Amusement Devices industry, due to public health restrictions related to COVID-19. The number of reported incidents increased from 97 in the previous year to 543 in this reporting year. However, the number of incidents reported was still 20 per cent lower than the 10-year average of 678, which suggests that we have not yet seen a full return to normal business and operations. Like the previous year, there were no fatalities in this reporting year in this sector.

Fifty per cent of incidents reported in the past 10 years occurred on amusement rides, while 30 per cent took place on water slides.

Other Initiatives

In fiscal year 2022, TSSA teamed up with the Ministry of Labour, Immigration, Training and Skills Development to help the amusement sector reopen its doors safely by providing COVID-19 education while performing technical inspections before the sector reopened. This joint effort by the Ministry of Labour, Immigration, Training and Skills Development and TSSA was driven by the shared goals of ensuring members of the public could enjoy amusement facilities safely and providing operators of amusement devices and water parks with information required to maintain safe environments and build their businesses after the pandemic disruption.

Amusement Devices Case Study:
Waterslide Tube Flips Injuring Rider

Background
While descending a waterslide at an indoor waterpark in Niagara Falls, a guest hit her shoulder on the slide when her tube flipped. An ambulance transported the guest to the hospital to treat a dislocated shoulder.

The slide was subsequently closed and inspected by a mechanic in training, who found no technical issues. Waterpark staff reported the incident to TSSA.

Stock image: Water slide.

Conclusions
While reviewing previous incidents that had taken place at the waterpark, TSSA noted an almost identical incident had occurred approximately two-and-a-half years prior.

TSSA Actions
TSSA confirmed that the indoor water park instructs its guests to hold onto the waterslide tubes with both hands. Before granting permission to return the waterslide to service, TSSA instructed the waterpark to have the waterslide inspected by a certified amusement device mechanic, who must use a safety verification checklist provided by TSSA. The slide was cleared to operate shortly thereafter.

Due to the easing of COVID-19 restrictions in this reporting year, there was a significant increase in waterslide incidents, as more Ontarians enjoyed amusement facilities. There were 198 waterslide incidents resulting in one permanent injury in fiscal year 2022.

While it is not clear if there were any actions or other factors that could have prevented this particular waterslide incident, explicit operational amusement device instructions provided by parks and a willingness from guests to heed safety rules certainly help to reduce risks of harm in amusement park settings.

Boilers & Pressure Vessels

TSSA's Boilers and Pressure Vessels Safety Program regulates the design, construction, maintenance, use, operation, repair and service of all pressure retaining components manufactured or used in Ontario. This includes equipment that produces and distributes hot water, steam, compressed air, and other compressed liquids and gases used in commerce and industry.

TSSA is involved in all aspects of the lifecycle of pressure vessels: from design, manufacture and installation to operation, maintenance and decommissioning. TSSA conducts engineering reviews, examines pressurized equipment and facilities prior to start-up, conducts periodic inspections on uninsured boilers and pressure vessels, surveys quality programs for equipment manufacturers, and certifies inspectors employed by insurers licensed to conduct periodic inspections of insured equipment.

167

CERTIFICATE HOLDERS
(CERTIFICATE OF COMPETENCY)

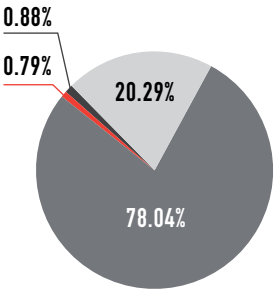
Incidents (FY22)

0	0	0
FATALITIES	PERMANENT INJURIES	NON-PERMANENT INJURIES

123 TOTAL INCIDENTS

2,866

CERTIFICATE OF
AUTHORIZATION HOLDERS



Root Cause of Incidents (FY22)

- NON-COMPLIANCE
- ROOT CAUSE NOT ESTABLISHED
- POTENTIAL GAPS IN REGULATORY SYSTEM
- EXTERNAL FACTORS

State of Public Safety in Ontario

Boilers and Pressure Vessels Safety Program

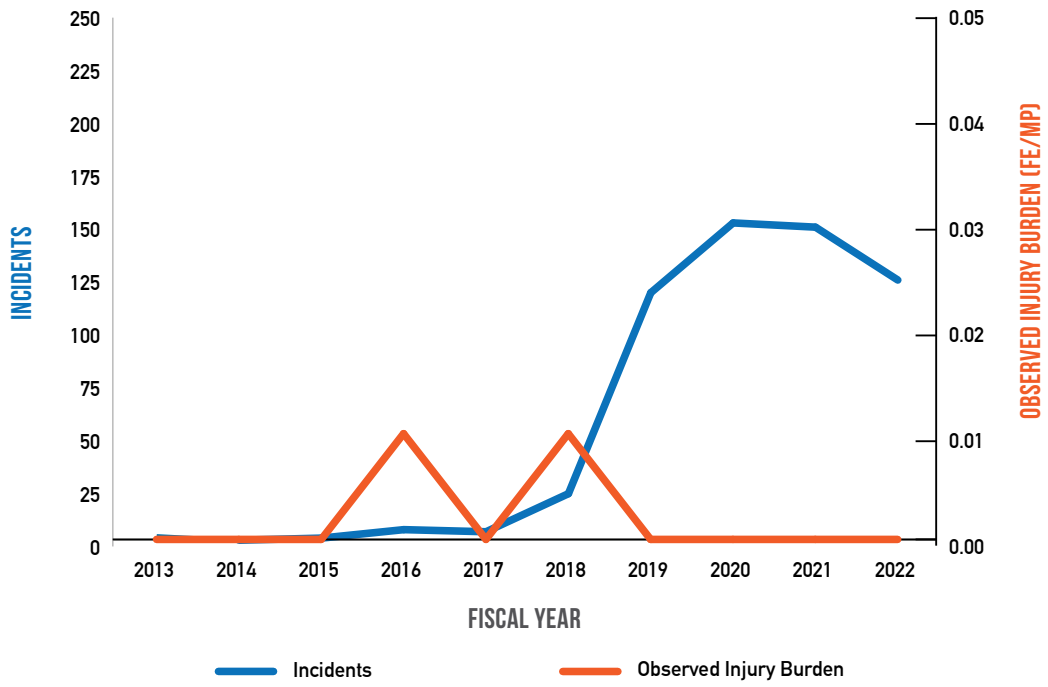
SUMMARY OF SAFETY NUMBERS				
REPORTING PERIOD	INCIDENTS	NON-PERMANENT INJURIES	PERMANENT INJURIES*	FATALITIES
10-year average	57	0	0	0
2022	123	0	0	0
INCIDENTS CURRENTLY UNDER REVIEW				
REPORTING PERIOD	INCIDENTS	NON-PERMANENT INJURIES	PERMANENT INJURIES*	FATALITIES
2022	8	0	0	0
2021	4	0	0	0

uninsured boilers and pressure vessels only

TSSA does not currently collect inspection and compliance data for 98 per cent of boilers and pressure vessels in Ontario. This is because most BPVs are insured, and insurance companies are responsible for those inspections. TSSA provides a Certificate of Inspection for those devices that have a valid record of inspection submitted by insurance companies.

For this reason, it is not possible to provide aggregated safety performance measures at this time.

Figure 7: 10-Year Safety Trends for Boilers and Pressure Vessels



There are no major significant changes to public safety as a result of boilers and pressures vessels in Ontario. TSSA recently published guidelines to clarify what incident and near miss data should be reported to TSSA, with the intent of improving the completeness of occurrences reported to TSSA for the purposes of data analytics and risk management.

Over 96 per cent of the incidents in FY22 were refrigerant leaks which was similar to last fiscal year (FY21). TSSA is examining the incident data on refrigerant leaks to better analyze patterns and trends on root causes and determine the necessary regulatory response. There have been no fatalities in the past 10 years in this program area.

Refer to Appendix B for more detailed information on boilers and pressure vessels.

Message from Ajay Raval, Boilers and Pressure Vessels Statutory Director

The state of public safety for Ontario's boilers and pressure vessels continued to remain stable in fiscal year 2022 (FY22). There were no major changes in incidents reported to TSSA, and TSSA inspectors continued to work closely with regulated parties to identify and mitigate potential and existing safety gaps through regular inspections and audits.

The number of incidents in FY22 dipped slightly from 148 to 123 – a 17 per cent decrease year-over-year. However, this is not considered a declining trend because the 10-year average is 57 incidents. We attribute the overall increase in incidents to ongoing efforts from TSSA, its Advisory Councils and regulated industry to improve the quality and frequency of incident reporting. In fact, new incident reporting guidelines were published in January 2022, to clarify that explosions, ruptures, and accidents involving boilers and pressure vessels must be immediately reported to TSSA, with more detailed follow-up reporting required within 48 hours of the occurrence.

TSSA reviews all incidents reported and assesses any actions that are required, including incident inspections, enforcement actions, and investigations, if appropriate. The details collected during these assessments amount to critical data that is used to enhance TSSA's risk assessment of the industry and determine further regulatory actions.

Other Initiatives

TSSA continues to collect data on the number of boilers and pressure vessels operating in Ontario through its Certificate of Inspection (COI) program, which has been active for four years. We worked with industry stakeholders in FY22 to revise and streamline the COI process. In addition, we implemented a lapsed authorizations renewal procedure which will ensure the individuals and businesses that own boilers are legally authorized to safely operate the devices. As a result of the lapsed authorizations renewal program, 85 per cent of authorizations in the Boilers and Pressure Vessels Safety Program that had lapsed in FY22 were successfully reinstated.

On July 1, 2021, after extensive stakeholder engagement, TSSA added agricultural boilers and pressure equipment to its safety program purview and risk data collection and analyzing activities, following the Ontario government's revocation of the agricultural equipment exemption from Ontario Regulation 220/01. To be in compliance with safety laws, owners and operators of agricultural operations are required to register with TSSA pressure equipment that was previously exempt. TSSA is using the information collected to conduct risk-based assessments and establish a priority list for scheduling device inspections within five years.

Boilers and Pressure Vessels Case Study:

Improperly Modified Underground Piping Blasts Hole in Sidewalk

Background

A high-pressure steam pipe exploded under a Southwestern Ontario sidewalk and blasted a hole in the concrete in front of a closed business establishment.

While no one was hurt, the pavement was substantially damaged. The owner reported the incident to TSSA.

Sidewalk explosion.

Defective underground piping.

Conclusions

During its investigation, TSSA performed an onsite inspection and removed the damaged pipe from the sidewalk.

In addition to obtaining a third-party root cause analysis report and results from material testing performed on the steam pipe, TSSA conducted an in-depth root cause analysis and determined the incident was the result of a combination of factors.

The steam pipe was initially installed in the 1940s. When the owner of the piping system performed modifications on the steam pipe in the 1980s, unapproved alteration methods and materials were used.

TSSA Actions

Regulations related to TSSA's Boiler and Pressure Vessels Safety Program oversight require organizations to submit a request for any planned pipeline alterations so that TSSA can review and approve engineering methods, welding procedures, materials, personnel qualifications, and design suitability. Since the alterations made by the owner predated the establishment of TSSA, its associated Act and regulations, as well as the American Society of Mechanical Engineers (ASME) piping repair code, there was no process for the company to obtain alteration approvals from TSSA. As such, there was no basis for TSSA to issue safety infraction orders. Instead, TSSA made several recommendations to the owner to maintain the safety of the piping system and prevent future incidents.

While this was a very serious incident, these types of events do not occur frequently in Ontario. This was the only explosion reported to TSSA during this reporting year, and there were no explosions reported in the prior year. Furthermore, there have only been four boiler and pressure vessel related permanent injuries reported to TSSA in the past 10 years and no fatalities.

This case study ultimately reinforces the essential oversight role TSSA plays in ensuring piping designs and modifications meet Ontario's technical safety requirements to prevent explosions and other harmful outcomes from putting the public at risk.

Elevating Devices

(Elevators)

TSSA's Elevating Devices Safety Program regulates elevators in Ontario to ensure all devices conform to the Act and applicable regulations, codes and standards. This includes: passenger, freight, hand-powered, observation, sidewalk, temporary, limited use/application elevators, dumbwaiters, material and freight platform lifts, lifts for persons with physical disabilities, man-lifts, construction hoists, incline lifts, stage lifts, and parking garage lifts.

TSSA reviews and register elevators, issues licences, conducts inspections, performs incident investigations, provides engineering services, registers contractors and certifies mechanics.

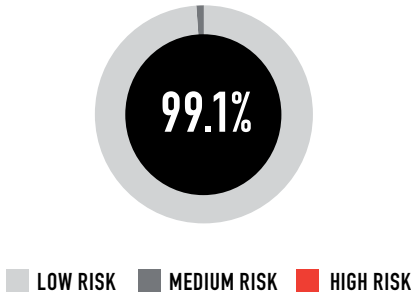
TSSA works closely with industry, through advisory councils and technical risk reduction committees, to propose improvements and implement effective safety strategies and solutions. Collectively, TSSA strives to ensure a safe environment for the riding public.

Number of Devices

63,837

Devices

Low-Risk Devices



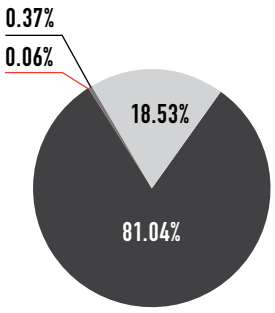
Incidents (FY22)

0	7	76
FATALITIES	PERMANENT INJURIES	NON-PERMANENT INJURIES

637 TOTAL INCIDENTS

3,901
LICENSED MECHANICS
(ELEVATORS AND ESCALATORS)

234
CONTRACTORS
(ALL ELEVATING DEVICES)



Root Cause of Incidents (FY22)

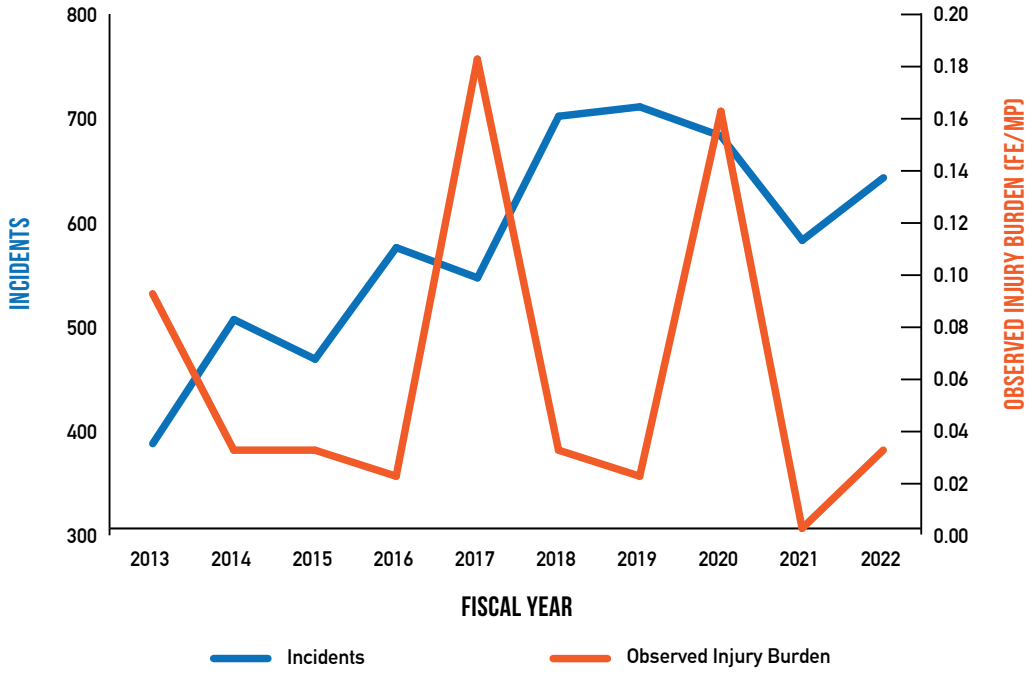
- NON-COMPLIANCE
- ROOT CAUSE NOT ESTABLISHED
- POTENTIAL GAPS IN REGULATORY SYSTEM
- EXTERNAL FACTORS

State of Public Safety in Ontario

Elevating Devices Safety Program – Elevators

SUMMARY OF SAFETY NUMBERS				
REPORTING PERIOD	INCIDENTS	NON-PERMANENT INJURIES	PERMANENT INJURIES	FATALITIES
10-year average	575	131	8	1
2022	637	76	7	0
INCIDENTS CURRENTLY UNDER REVIEW				
REPORTING PERIOD	INCIDENTS	NON-PERMANENT INJURIES	PERMANENT INJURIES	FATALITIES
2022	19	7	0	0
2021	9	0	0	0
2020	26	0	0	0
2019	56	0	0	0
2018	5	0	0	0

Figure 14: 10-Year Safety Trends for Elevators



Similar to other sectors, in FY20 and FY21 there were fewer reported incidents that occurred on elevating devices as a result of publicly mandated business closures. However, elevating device incident reports increased in FY22.

In fact, the number of incidents in FY22 (637) was 10 per cent greater than the 10-year average of 575.

However, the number of non-permanent injuries in FY22 (76) remained lower than the 10-year average of 131.

There were no fatalities reported this year again.

The Observed Injury Burden (OIB) is reported based on the severity of injuries in that year. The OIB is the measure in fatality equivalent (FE) observed each year and normalized by the population of Ontario (FE/mp).

Figure 14 shows that the OIB for elevators spiked in FY20 – this was due to a fatality reported in the program area, whereby an individual had fallen after climbing on top of an elevator.

The OIB for FY22 was 0.03 FE/mp, which means that most of the injuries reported – like aches, pains and external bruises – were not severe.

The OIB for this fiscal year is higher than last fiscal year (0.01 FE/mp) primarily due to the increase in incidents and permanent injuries during this fiscal year.

TOP SAFETY ISSUES (EXTERNAL FACTORS) FY22			
BY INCIDENTS		BY OBSERVED INJURY BURDEN	
Rental Apartment Buildings	22.98%	Rental Apartment Buildings	30.71%
Condominiums	20.35%	Offices	27.47%
Offices	20.06%	Condominiums	15.89%

Over 87 per cent of FY22 elevator incidents are related to external factors that fall under the "Utilities (power, water, telecom, sewage)" clause of 8.2. Some of these incidents included the following:

1. Flooding incidents where water got into the pit
2. Sewer backup incidents
3. Incidents in which water got into condominium elevators and set off sprinkler systems

HEALTH IMPACT			
OBSERVED		POTENTIAL	
0.06 FE/mp (10-year Average) Injury Burden	**0.03 FE/mp** (2022) Injury Burden	**0.04 FE/mpy** (2022) Risk of Injury or Fatality	**0.07 FE/mpy** (2021) Risk of Injury or Fatality

TSSA's RIF estimates the potential for injury or fatality by analyzing reported 10-year incident data and performing a Monte Carlo simulation. This provides a value that represents the potential of injuries based on past performance. The RIF for elevators decreased this fiscal year compared to last fiscal year due to the 14.8 per cent reduction in non-permanent injuries.

Risk Profile of Regulated Entities

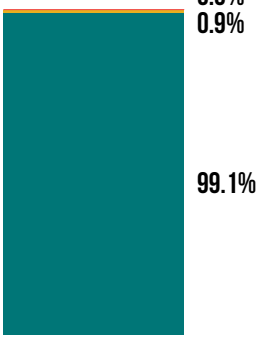
TSSA estimates the relative risk of the elevators it regulates by analyzing the data collected during inspection activities. Orders issued at a periodic inspection are risk assessed, and regulated parties are given a specific amount of time to comply with safety orders based on the relative exposure that is tolerable for the potential hazard if the order's safety issue is not corrected on time. Based on this risk score, TSSA estimates that there were eight high-risk devices in Ontario in FY22.

Of the 11,788 periodic inspections conducted in FY22, 0.2 per cent found high-risk non-compliances – this is the same as last fiscal year.

The most common high-risk issues found during inspections were drive machine brakes not stopping appropriately, and incorrect holding capacity.

Top issues found by count involved late annual periodic task for emergency and lowering operation, firefighter emergency operations and current elevator license is not valid/posted.

INVENTORY RISK PROFILE 2022



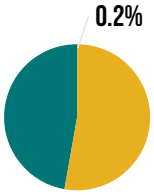
There were eight (0 per cent) high-risk devices compared to 38 last fiscal year.

Over 99 per cent of the qualified provincial inventory are low risk.

2018 - 2022 FIVE-YEAR AVERAGE

19.3%

PERCENTAGE COMPLIANCE



INSPECTION RISK SPECTRUM 2022

GREEN
LOW RISK

Green indicates safety issues that are low risk and require periodic inspection.

YELLOW
MEDIUM RISK

Yellow indicates minor safety issues that are medium risk and require enhanced monitoring.

RED
HIGH RISK

Red indicates major safety issues that are high risk and require an actionable response.

Refer to Appendix E for further information on elevators.

Message from Roger Neate, Elevators Statutory Director

As COVID-19 cases dropped and people returned to work and more normal routines, the Elevating Devices Safety Program saw a corresponding return to more historic trends in both incidents and injuries. In fiscal year 2022 (FY22), 637 occurrences were reported, compared to the 10-year trend of 575. That said, there were 76 injuries in this reporting year, which is a 42 per cent decrease from the 10-year average. The elevating devices sector was able to perform safely this year, despite ongoing disruptions from changes to public health guidelines which impacted the use of elevators.

Other Initiatives

TSSA Compliance Support Program advisors continued to work diligently with elevator owners and contractors with devices deemed high risk to address their specific non-compliance issues. Of the 78 elevating device entities that accepted TSSA's offer of compliance support since the start of the program until the end of FY22, 83 per cent saw a reduction in risk scores. The risk score reflects the compliance of the entity and any associated incidents. Entities that are more compliant have lower risk scores.

A key component of TSSA's Outcome-Based-Regulator strategy is the implementation of compliance standards, which are designed to help elevator owners and operators better understand safety priorities and identify items that may pose a high risk to public safety if not addressed. Over the past year, TSSA worked with industry partners to develop new compliance standards for hydraulic elevators and traction elevators. TSSA is actively engaging with industry to educate elevator owners and operators about the new compliance standards, which were posted in advance on TSSA's website to prepare industry for the coming changes and official launch in late FY23.

As part of this initiative, TSSA will no longer perform follow-up inspections on low- and medium-risk non-compliances, which are defined as safety tasks. TSSA will still identify safety tasks on inspection reports, and owners and operators will be accountable for ensuring the safety tasks are resolved in accordance with compliance standard timelines. TSSA will continue to perform follow-up inspections on high-risk non-compliances, while safety task risk levels will be reassessed during a regulated party's next periodic inspection.

Another major element of TSSA's Outcome-Based Regulator transformation has been a concentrated focus on ensuring that all operating devices in Ontario have current authorizations. To legally operate an elevating device in Ontario, the device must have a valid licence. At the start of FY22, TSSA implemented a procedure to identify devices with licences that expired after May 1, 2021, and contact the owners to ensure they renew their licences if the devices are still operational. In cases where owners of operational devices did not comply with authorization reinstatement requirements, TSSA inspectors removed the devices from service. In its first year, the program resulted in an overall lapsed authorization resolution rate of 94 per cent across all TSSA safety program areas. In the coming year, TSSA is evolving the initiative to focus on authorizations that failed to renew prior to May 2021. In these cases, owners of the unauthorized devices will be required to apply for a new licence and must undergo a full inspection prior to their devices being returned to service.

In accordance with new legislation passed by the Ontario government in June 2021, owners and licensees of elevators in residential buildings and long-term care homes are required to report elevator outages lasting 48 hours or longer as of July 1, 2022. Over the past year, TSSA was actively building the Residential Elevator Availability Portal to facilitate the reporting of elevator outages. Reporting must be completed within 30 days after the day the elevator is returned to service. TSSA publishes the historical data online to help Ontarians make informed decisions about buying or renting a home. In addition, data collected from elevator outage reports will inform and shape future regulatory decisions on elevators.

Elevators Case Study:

Passenger Climbs on Top of Elevator Car and Gets Trapped

Background

At a transit station in Ottawa, a young male climbed on top of the elevator handrail and made multiple attempts to jump from the railing to access the ceiling hatch. Eventually, the man forced the hatch open and climbed on top of the elevator car.

Though the man was unharmed, he became trapped in the hoistway. Emergency services and an elevator mechanic arrived on site quickly to remove the individual.

TSSA was subsequently called to investigate and reviewed the closed-circuit television (CCTV) video footage to confirm the details of the incident.

Ceiling hatch pushed hard enough to bend the metal that keeps the door closed.

Conclusions

Upon inspection of the elevator, which had already been removed from service, TSSA found that the hatch door had been damaged by the passenger's use of force and was no longer locking properly.

TSSA Actions

TSSA issued orders to have the elevator repaired before it was returned to service. These were resolved in short order, and the elevator was quickly made available for public use.

While elevator incidents [637 in fiscal year 2022 (FY22) versus 577 in FY21] and elevator-related permanent injuries (seven in FY22 compared to six in FY21) in Ontario have increased slightly, TSSA has seen no concerning trends in the data.

TSSA recognizes that there are many risk factors that contribute to elevator-related incidents, such as user behaviour (including instances in which people unintentionally and often unknowingly put themselves at risk) which can be influenced but not fully controlled, making traditional enforcement activities unlikely to be effective on their own.

Providing public education and consumer information continues to be a valuable tool for increasing public awareness of safety hazards and encouraging prudent safety habits. TSSA offers various online resources, including situational videos and pamphlets that identify potential public safety risks posed by improper elevator use and provide education on safe elevator etiquette.

Elevating Devices

(ESCALATORS AND MOVING WALKS)

TSSA's Elevating Devices Safety Program regulates escalators and moving walks in Ontario to ensure all devices conform to the Act and applicable regulations, codes and standards.

TSSA reviews and registers escalator and moving walks, issues licences, conducts inspections, performs incident investigations, provides engineering services, registers contractors and certifies mechanics.

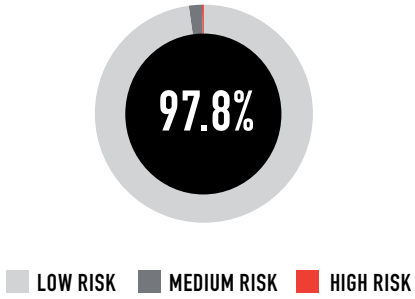
TSSA works closely with industry, through advisory councils and technical risk reduction committees, to propose improvements and implement effective safety strategies and solutions. Collectively, TSSA strives to ensure a safe environment for the riding public.

Number of Devices

2,227

DEVICES

Low-Risk Devices



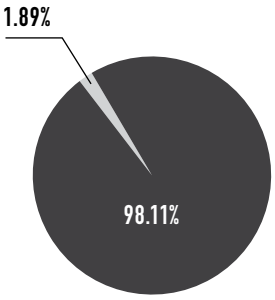
Incidents (FY22)

0	1	301
FATALITIES	PERMANENT INJURIES	NON-PERMANENT INJURIES

508 TOTAL INCIDENTS

3,901
LICENSED MECHANICS
(ELEVATORS AND ESCALATORS)

234
CONTRACTORS
(ALL ELEVATING DEVICES)



Root Cause of Incidents (FY22)

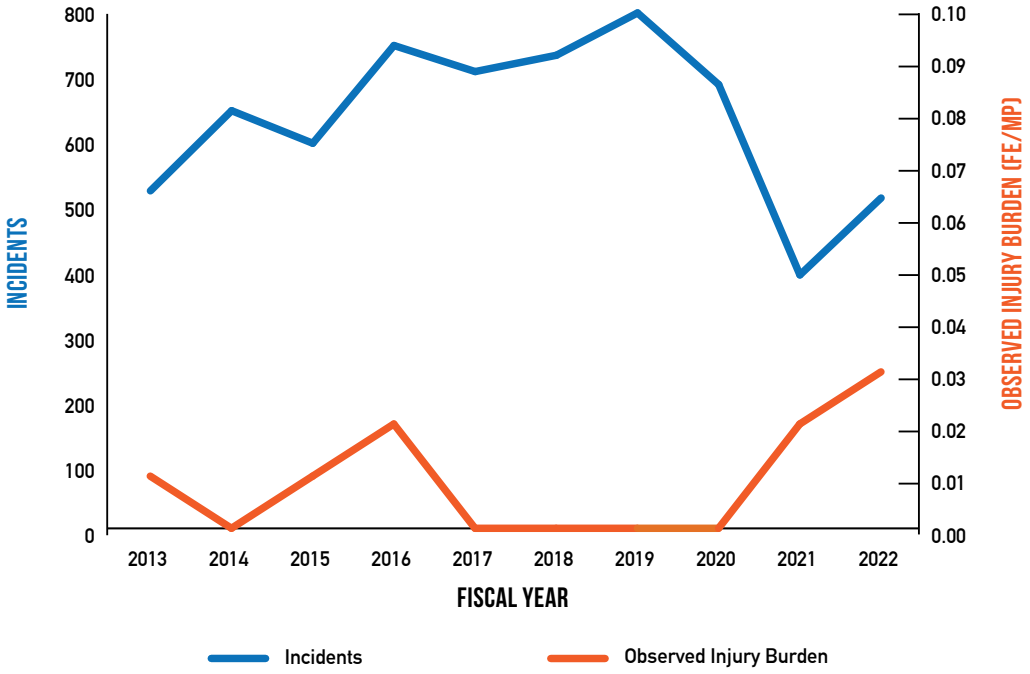
- NON-COMPLIANCE
- ROOT CAUSE NOT ESTABLISHED
- POTENTIAL GAPS IN REGULATORY SYSTEM
- EXTERNAL FACTORS

State of Public Safety in Ontario

Elevating Devices Safety Program - Escalators and Moving Walks

SUMMARY OF SAFETY NUMBERS				
REPORTING PERIOD	INCIDENTS	NON-PERMANENT INJURIES	PERMANENT INJURIES	FATALITIES
10-year average	630	407	3	0
2022	508	301	1	0

Figure 17: 10-Year Safety Trends for Escalators and Moving Walks



Similar to other industries, as the province returned to pre-pandemic activity levels in commercial, transportation and retail and other buildings where escalators and moving walks are installed, there has been an increase in the number of incidents reported to TSSA.

The number of injuries this year at 302 remains lower than the 10-year average of 410. There continues to be no fatalities in this program area.

The Observed Injury Burden (OIB) is reported based on the severity of injuries in that year. The OIB is the measure in fatality equivalent (FE) observed each year and normalized by the population of Ontario (FE/mp).

Last fiscal year, an individual tripped and fell on a subway escalator and died, likely due to a pre-existing medical condition.

The OIB for FY22 was 0.03 FE/mp. This means that most of the injuries reported have a very low severity (for example aches, pains, external bruises, and laceration or superficial cuts).

The OIB for this fiscal year is higher than the 10-year average (0.01 FE/mp) primarily due to the increase in incidents and non-permanent injuries.

TOP SAFETY ISSUES FY22			
BY INCIDENTS		BY OBSERVED INJURY BURDEN	
Mass Transportation	63.79%	Commercial (Mercantile)	56.90%
Commercial (Mercantile)	29.32%	Mass Transportation	40.56%
Offices	4.19%	Assemblies	1.31%

Over 91 per cent of escalator and moving walk incidents are related to external factors that fall under the "Failure to follow user instructions" clause of 7.6. Some of these incidents included the following:

1. Trips and falls where passengers lose balance
2. Passengers carrying carts and bicycles
3. Younger passengers (kids) running up and down an escalator

HEALTH IMPACT			
OBSERVED		POTENTIAL	
0.01 FE/mp (10-year Average) Injury Burden	**0.03 FE/mp** (2022) Injury Burden	**0.02 FE/mpy** (2022) Risk of Injury or Fatality	**0.01 FE/mpy** (2021) Risk of Injury or Fatality

TSSA's RIF estimates the potential for injury or fatality by analyzing reported 10-year incident data and performing a Monte Carlo simulation. This provides a value that represents the potential of injuries based on past performance. The RIF for escalators this fiscal year increased slightly compared to the last fiscal year.

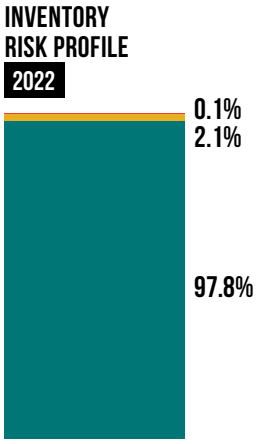
Risk Profile of Regulated Entities

TSSA estimates the relative risk of the escalators and moving walks it regulates by analyzing the data collected during inspection activities. Orders issued at a periodic inspection are risk assessed, and regulated parties are given a specific amount of time to comply with safety orders based on the relative exposure that is tolerable for the potential hazard if the order's safety issue is not corrected on time. Based on this risk score, TSSA estimates that there was only one high-risk device in FY22.

Of the 532 periodic inspections conducted in FY22, 0.2 per cent found high-risk non-compliances – this has increased 16.97 per cent compared to the last fiscal year.

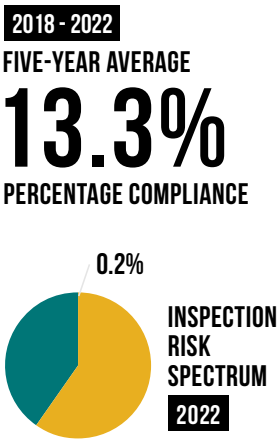
The most common high-risk issues found during inspections were inadequate brake torque.

Top issues found by count include late annual periodic task for skirt/step performance index and tests for escalator clearance between step and skirt-loaded gap.



There was only one high-risk device (0.1 per cent).

Over 97 per cent of the qualified provincial inventory are low risk.



GREEN
LOW RISK

Green indicates safety issues that are low risk and require periodic inspection.

YELLOW
MEDIUM RISK

Yellow indicates minor safety issues that are medium risk and require enhanced monitoring.

RED
HIGH RISK

Red indicates major safety issues that are high risk and require an actionable response.

Refer to Appendix F for further information on escalators and moving walks.

Message from Roger Neate, Escalators and Moving Walks Statutory Director

Safety levels in the escalators and moving walks sector have remained stable this past year. We have seen a 30 per cent increase in the number of occurrences reported to TSSA compared to last year – from 390 in fiscal year 2021 (FY21) to 508 in FY22. However, this is not considered a major concern because it is still below the 10-year average of 630 occurrences per year. Additionally, the number of reported injuries remains lower than the 10-year average. The top safety issues are seen in escalators in mass transportation settings, which is consistent with TSSA's assessment that the increase in FY22 is a result of the easing of pandemic lockdowns.

As in previous reports, TSSA notes that 98 per cent of incidents reported are attributed to external factors, such as passengers losing balance or carrying inappropriate, bulky items on the escalator or kids running up the escalator. TSSA continues to work with its partners in public safety to ensure passengers are reminded of safety rules.

Other Initiatives

During FY22, TSSA collaborated with industry partners to develop new escalator compliance standards for owners and contractors. These compliance standards are a major component of TSSA's larger Outcome-Based-Regulator strategy, through which TSSA will help owners and contractors focus on high-risk items to reduce the potential for harm and take greater responsibility and ownership for the safety of their escalators. Communications are underway to educate owners and contractors about the new compliance standards, which come into effect in late FY23.

In last year's public safety report, we noted concerns with skirt/step performance index (SSPI) testing not being performed properly. There were considerably less SSPI-related safety orders issued in this reporting period (88 orders) compared to the last reporting year (231 orders). To address SSPI testing concerns, we have included SSPI testing in the new compliance standards noted above. Our expectation is that owners and contractors will continuously ensure that SSPI remains in compliance at all times by consulting the compliance standard. If a TSSA inspector finds that the tests are not done or the SSPI test results in the logbook do not comply with allowable tolerances as clearly outlined in the compliance standard, the device will be removed from service.

Escalators Case Study:

Older Adult Falls After Leaning on Escalator Handrail

Background

Riding upwards on an escalator at a Kingston department store, an 85-year-old woman leaned on the handrail for extra stability. As she approached the top, her shoulder struck and shattered a glass barrier between the wall and escalator, and she fell to the ground.

Department store staff assisted the lady with gauze and band-aids to treat minor cuts on her hand. The woman chose not to seek additional medical attention.

After putting the escalator out of service, department store staff called an elevator contractor who reported the incident to TSSA.

The glass shattered on impact with the rider's shoulder.

Conclusions

Upon receiving the full report, TSSA determined that the incident occurred because the rider misused the escalator.

TSSA Actions

TSSA allowed the escalator to go back into service after the contractor installed a thick piece of wood to replace the glass barrier as a temporary safety solution until the correct replacement glass could be obtained shortly after.

Escalator incidents increased significantly in this reporting year [508 incidents in fiscal year 2022 (FY22) versus 390 incidents in FY21], due to an increase in ridership that occurred when provincial COVID-19 lockdown restrictions were loosened.

While escalators are very safe and reliable, riders can fall and sustain injuries if they are not using the devices as they are designed to be used. TSSA provides a wealth of escalator-safety information for the public at www.safetyinfo.ca and has produced a series of situational videos that can viewed on TSSA's YouTube channel.

Elevating Devices

(PASSENGER ROPEWAYS & SKI LIFTS)

TSSA's Ski Lifts Safety Program regulates the safety of passenger ropeways (ski lifts) in Ontario, including chair lifts, bar lifts, recreational conveyors, gondola lifts, reversible ropeways, passenger ropeways, rope tows, tube tows, belt tows and aerial tramways.

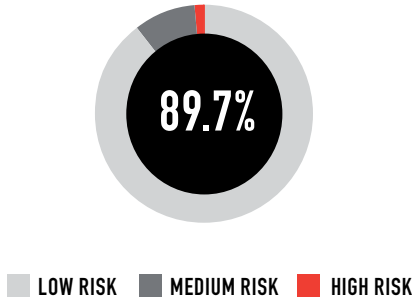
TSSA reviews and registers lift designs, licenses lift devices, conducts inspections, performs incident investigations and promotes public awareness of safe ski-lift behaviour throughout Ontario. In addition, TSSA certifies ski lift mechanics and registers contractors.

Number of Devices

299

SKI LIFTS

Low-Risk Devices



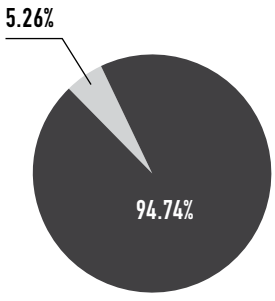
Incidents (FY22)

0	3	59
FATALITIES	PERMANENT INJURIES	NON-PERMANENT INJURIES

73 TOTAL INCIDENTS

317
SKI LIFT MECHANICS

234
CONTRACTORS
(ALL ELEVATING DEVICES)



Root Cause of Incidents (FY22)

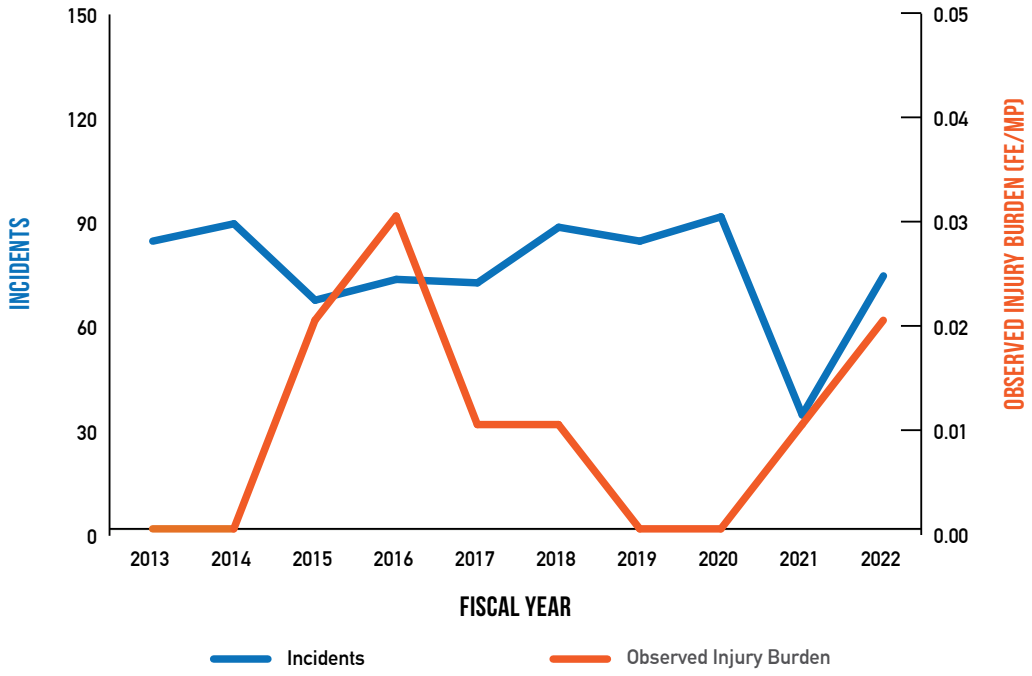
- NON-COMPLIANCE
- ROOT CAUSE NOT ESTABLISHED
- POTENTIAL GAPS IN REGULATORY SYSTEM
- EXTERNAL FACTORS

State of Public Safety in Ontario

Elevating Devices Safety Program - Passenger Ropeways (Ski Lifts)

SUMMARY OF SAFETY NUMBERS				
REPORTING PERIOD	INCIDENTS	NON-PERMANENT INJURIES	PERMANENT INJURIES	FATALITIES
10-year average	75	58	2	0
2022	73	59	3	0
INCIDENTS CURRENTLY UNDER REVIEW				
REPORTING PERIOD	INCIDENTS	NON-PERMANENT INJURIES	PERMANENT INJURIES	FATALITIES
2022	1	0	0	0

Figure 19: 10-Year Safety Trends for Ski Lifts



Similar to other program areas, TSSA is seeing an increase in incidents and injuries as Ski Lifts across the province started up again after COVID-19 mandated lockdowns and closures in FY20 and FY21.

Although FY22 saw a 55 per cent increase in incidents and a 58 per cent increase in non-permanent injuries compared to last year, these numbers are still lower than the 10-year average.

There have been no fatalities in ski lifts in the past ten years.

The Observed Injury Burden (OIB) is reported based on the severity of injuries in that year. The OIB is the measure in fatality equivalent (FE) observed each year and normalized by the population of Ontario (FE/mp).

The OIB for FY22 was 0.02 FE/mp. This means that most of the injuries reported have a very low severity (for example concussions, fractures, and external bruising).

The OIB for this fiscal year (0.02FE/mp) has increased compared to the 10-year average (0.01 FE/mp) primarily due to the increase in incidents and injuries. The number of incidents and near-misses are more than doubled this fiscal year compared to the last fiscal year.

TOP SAFETY ISSUES FY22			
BY INCIDENTS		BY OBSERVED INJURY BURDEN	
Chair Lifts	84.32%	Chair Lifts	84.02%
Passenger Conveyors	8.71%	Rope Tows	9.89%
Bar Lifts	4.29%	Passenger Conveyors	4.13%

Over 92 per cent of ski lift incidents are related to external factors that fall under the "Failure to follow user instructions" clause of 7.6. Some of these incidents included the following:

1. Customers falling off a chair at the loading/unloading areas
2. Customers hitting their head on a bar lift

HEALTH IMPACT			
OBSERVED		POTENTIAL	
0.01 FE/mp (10-year Average) Injury Burden	**0.02 FE/mp** (2022) Injury Burden	**0.01 FE/mpy** (2022) Risk of Injury or Fatality	**0.01 FE/mpy** (2021) Risk of Injury or Fatality

TSSA's RIF estimates the potential for injury or fatality by analyzing reported 10-year incident data and performing a Monte Carlo simulation. This provides a value that represents the potential of injuries based on past performance. The RIF for ski lifts was the same in FY22 and FY21 (0.01FE/mpy).

Risk Profile of Regulated Entities

TSSA estimates the relative risk of the ski lifts it regulates by analyzing the data collected during inspection activities. Orders issued at a periodic inspection are risk assessed, and the regulated parties are given a specific amount of time to comply with safety orders based on the relative exposure that is tolerable for the potential hazard if the order's safety issue is not corrected on time. Based on this risk score, TSSA estimates that there were only three high-risk devices in Ontario in FY22.

Of the 107 periodic inspections conducted in FY22, 11.1 per cent found high-risk non-compliances – this is a 1.3 per cent increase from 9.8 per cent in the last fiscal year.

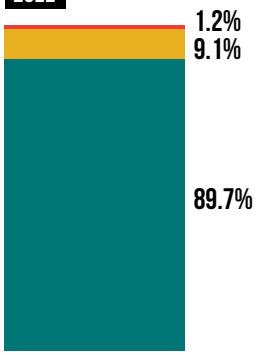
The 12 operational inspections conducted in FY22 found no high-risk non-compliances – this is the same as last fiscal year.

The most common high-risk issue found during periodic inspections was insufficient clearance.

The most common high-risk issue found during operational inspections was the safety gate being too far from the unload point.

Top issues found by count include evacuation training not being conducted and the lack of supervising and training all personnel.

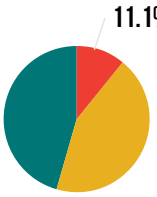
INVENTORY RISK PROFILE 2022



There were three high-risk devices (1.2 per cent).

Over 89 per cent of the qualified provincial inventory are low risk.

2018 - 2022
FIVE-YEAR AVERAGE
38.4%
PERCENTAGE COMPLIANCE



INSPECTION RISK SPECTRUM 2022

GREEN
LOW RISK

Green indicates safety issues that are low risk and require periodic inspection.

YELLOW
MEDIUM RISK

Yellow indicates minor safety issues that are medium risk and require enhanced monitoring.

RED
HIGH RISK

Red indicates major safety issues that are high risk and require an actionable response.

Refer to Appendix G for further information on passenger ropeways (ski lifts).

Message from Roger Neate, Ski Lifts Statutory Director

This past year, TSSA was very pleased to see the industry bounce back from the impacts of COVID-19 pandemic restrictions. The number of incidents and resulting injuries have returned to historic trends with no concerning upsurges.

Other Initiatives

With the goal of supporting industry members to understand their safety priorities, TSSA established compliance standards for ski lifts based on the highest risks found through inspections and incident history. Compliance standards identify the key safety items industry needs to focus on to help ensure the safety of their devices and the people who use them. TSSA introduced the new compliance standards at the Ontario Snow Resort Association AGM, Trade Show and Conference, and the industry's response to TSSA's new approach to inspections was very positive. TSSA will continue educating industry members in the coming months leading up to the formal launch of the new compliance standards in late FY23.

Ski Lift Case Study:

Snowboarder Raises Ski Lift Safety Bar Early & Falls 14 Feet

Background

Anxious to unload her snowboarding equipment, a 17-year-old girl lifted the safety bar on a ski lift shortly before reaching the 'raise the bar' sign. As she sat forward on her seat, the operator stopped the lift, and the girl slipped and fell 14 feet to the ground.

After confirming with the ski patrol that the girl was not injured, the ski resort's operations manager checked in on the girl and her family, and then reported the incident to the Spills Action Centre, which alerted TSSA.

Image source: TSSA/CSIA/OSRA ski lift safety tips video.

Conclusions

After interviewing the ski resort operations manager, TSSA determined the ski lift was in safe working condition and the incident was caused by user error.

TSSA Actions

Ski lift-related incidents more than doubled, with 73 occurring in fiscal year 2022 (FY22) and 33 occurring in FY21. However, this upsurge is due to increased user activity as pandemic restrictions eased at the start of calendar year 2022.

The vast majority of incidents in which people are injured using ski lifts are a direct result of unsafe user behaviour. It is essential that riders observe and obey all posted signs and warnings and listen to safety instructions from lift attendants.

To raise awareness of ski lift riders' safety responsibilities, TSSA has a dedicated ski lift safety website for the public, www.skiliftsafety.ca, and promotes ski lift safety messaging seasonally.

Fuels Safety Program

TSSA's Fuels Safety Program regulates the transportation, storage, handling and use of fuels in Ontario including natural gas, propane, fuel oil, gasoline, diesel, butane, hydrogen, digester gas, and landfill gas. TSSA carries out inspections and licenses pipelines, gas stations, propane filling stations, marinas and tanker trucks. TSSA issues licences to operate fuel facilities and pipelines, registers contractors and certifies tradespersons who install and service fuel-burning equipment.

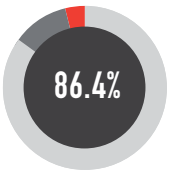
TSSA reviews and approves facility plans for TSSA-licensed sites and performs custom equipment approvals and inspections to ensure fuel is handled and used safely. TSSA investigates incidents and reports of non-compliance and provides technical expertise to industry stakeholders, safety partners and consumers.

Number of Sites

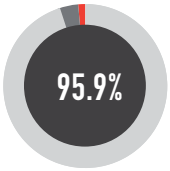
4,372
LIQUID FUELS SITES

1,116
PROPANE SITES

Low-Risk Sites



LIQUID FUELS SITES CONSIDERED LOW RISK



PROPANE SITES CONSIDERED LOW RISK

LOW RISK MEDIUM RISK HIGH RISK

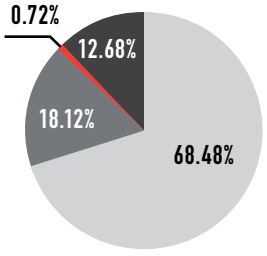
Incidents (FY22)

2	10	20
FATALITIES	PERMANENT INJURIES	NON-PERMANENT INJURIES

2,569 TOTAL INCIDENTS

71,983
CERTIFICATE HOLDERS
(30+ CATEGORIES)

8,453
REGISTERED CONTRACTORS



Root Cause of Incidents (FY22)

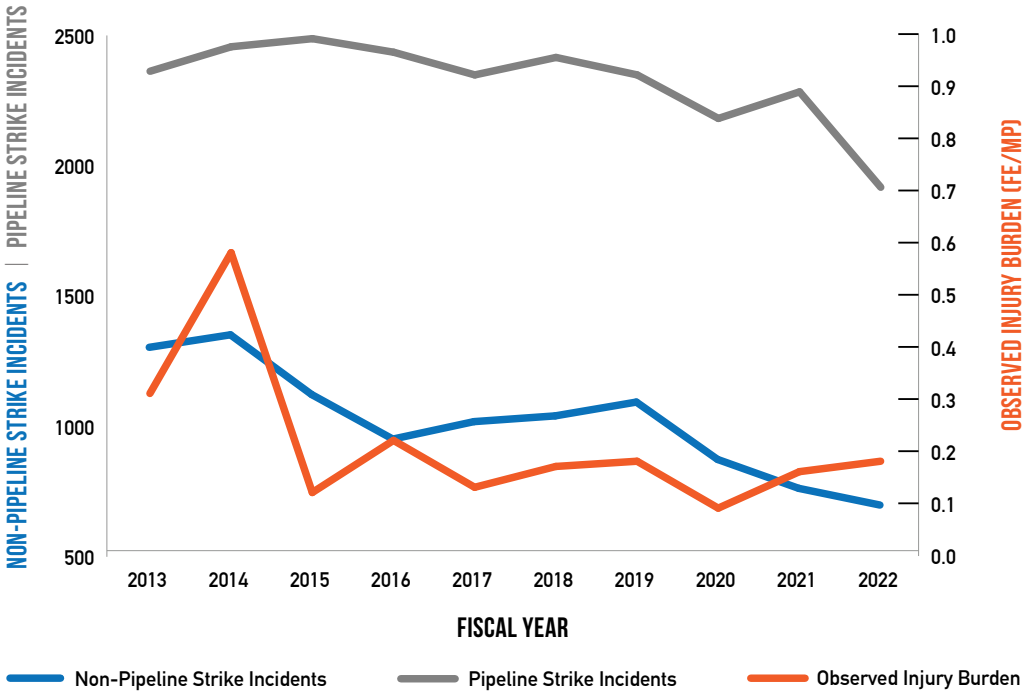
NON-COMPLIANCE
ROOT CAUSE NOT ESTABLISHED
POTENTIAL GAPS IN REGULATORY SYSTEM
EXTERNAL FACTORS

State of Public Safety in Ontario

Fuels Safety Program

SUMMARY OF SAFETY NUMBERS				
REPORTING PERIOD	INCIDENTS	NON-PERMANENT INJURIES	PERMANENT INJURIES	FATALITIES
10-year average	3,298	40	13	3
2022	2,569	20	10	2
INCIDENTS CURRENTLY UNDER REVIEW				
REPORTING PERIOD	INCIDENTS	NON-PERMANENT INJURIES	PERMANENT INJURIES	FATALITIES
2022	524	8	0	1

Figure 20: 10-Year Safety Trends for Fuels



Overall, the number of incidents and injuries in the Fuels Safety program has been showing signs of improvement. 2,569 incidents were reported in FY22 compared to the 10-year average of 3,298. Similarly, the number of injuries has decreased from an average of 53 to 30 this year.

There were two fatalities this year. In addition, an incident resulting in a fatality is currently under investigation and will be reported in the next edition of the Public Safety Report once the case is closed.

One of the two fatalities happened due to the faulty installation of a fridge that caused excessive carbon monoxide (CO) release; the other fatality was caused by an explosion of a heat-treating appliance.

The Observed Injury Burden (OIB) is reported based on the severity of injuries in that year. The OIB is the measure in fatality equivalent (FE) observed each year and normalized by the population of Ontario (FE/mp).

Figure 20 shows that the OIB for Fuel Safety spiked in FY14 – this was due to 10 fatalities reported in that program area, which is the highest number reported within a FY to date. Eight out of the 10 fatalities were due to CO exposure in private dwellings, and one was due to a fire/explosion while the other incident happened due to vapour release.

The OIB for FY22 was 0.17 FE/mp. This means that most of the injuries reported have a low/medium severity (for example nausea, dizziness, and poisoning).

The OIB for this year continues to be lower than the 10-year average (0.20 FE/mp) primarily due to the decrease in incidents and injuries.

TOP HIGH-RISK LICENSED SITES FY22			
LIQUID FUELS		PROPANE	
Gas Stations	76.5%	Cylinder Refill Centres	55.6%
Marinas	16.3%	Unknown	33.3%
Bulk Plants	7.1%	Propane Filling Plants > 5000 USWG	11.1%

Over 68 per cent of Fuel incidents are related to non-compliance that fall under the "Improper or negligent work practices" clause of 6.3. Some of these incidents included the following:

1. Components/pipelines damaged by machine/equipment
2. Equipment not maintained properly
3. Leaks and valves left half opened

HEALTH IMPACT			
OBSERVED		POTENTIAL	
0.20 FE/mp (10-year Average) Injury Burden	**0.17 FE/mp** (2022) Injury Burden	**0.19 FE/mpy** (2022) Risk of Injury or Fatality	**0.22 FE/mpy** (2021) Risk of Injury or Fatality

TSSA's RIF estimates the potential for injury or fatality by analyzing reported 10-year incident data and performing a Monte Carlo simulation. This provides a value that represents the potential of injuries based on past performance. The RIF for Fuels Safety Program decreased by 0.03 FE/mp in FY22 compared to the last fiscal year.

Risk Profile of Regulated Entities

TSSA estimates the relative risk of the fuels equipment and sites it regulates by analyzing the data collected during inspection activities. Orders issued at a periodic inspection are risk assessed, and the regulated parties are given a specific amount of time to comply with safety orders based on the relative exposure that is tolerable for the potential hazard if the order's safety issue is not corrected on time. TSSA estimates that there were 98 high-risk devices for liquid fuels and nine high-risk devices for propane in Ontario in FY22.

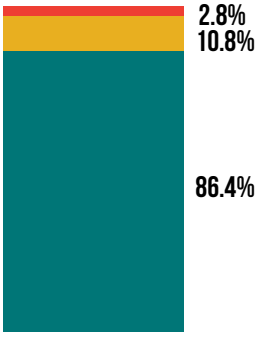
LIQUID FUELS

Of the 212 periodic inspections conducted in FY22, 0.3 per cent found high-risk non-compliances – this has decreased by 0.1 per cent compared to the last fiscal year.

The most common high-risk issues found during inspections was following proper outdoor storage procedures.

Top issues found by count include documentation missing for valve and leak detection system, and defective equipment needs to be repaired or replaced.

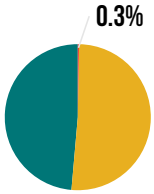
INVENTORY RISK PROFILE
2022



There were 98 high-risk devices (2.8 per cent).

Over 86 per cent of the qualified provincial inventory are low risk.

2018 - 2022
FIVE-YEAR AVERAGE
41.1%
PERCENTAGE COMPLIANCE



INSPECTION RISK SPECTRUM
2022

GREEN
LOW RISK

Green indicates safety issues that are low risk and require periodic inspection.

YELLOW
MEDIUM RISK

Yellow indicates minor safety issues that are medium risk and require enhanced monitoring.

RED
HIGH RISK

Red indicates major safety issues that are high risk and require an actionable response.

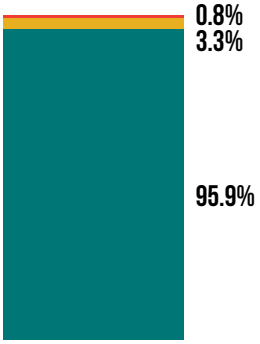
PROPANE

Of the 289 periodic inspections conducted in FY22, 1.4 per cent found high risk non-compliances – this has decreased by 0.4 per cent compared to the last fiscal year.

The most common high-risk safety issue found during inspections was the lack of notification to inspector after an incident.

Top safety issues found by count include "readily ignitable materials around storage container" and "equipment not maintained as per safety procedures".

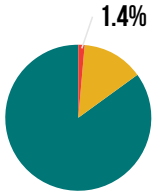
INVENTORY RISK PROFILE
2022



There were nine high-risk devices (0.9 per cent).

Over 95 per cent of the qualified provincial inventory are low risk.

2018 - 2022
FIVE-YEAR AVERAGE
74.0%
PERCENTAGE COMPLIANCE



INSPECTION RISK SPECTRUM
2022

GREEN
LOW RISK

Green indicates safety issues that are low risk and require periodic inspection.

YELLOW
MEDIUM RISK

Yellow indicates minor safety issues that are medium risk and require enhanced monitoring.

RED
HIGH RISK

Red indicates major safety issues that are high risk and require an actionable response.

Refer to Appendix H for further information on fuels.

Message from Sam Sadeghi, Fuels Statutory Director

The Fuels Safety Program saw some very positive and reassuring trends in the past year. Reported incidents were down 15 per cent compared to the previous reporting year and down 22 per cent compared to the 10-year average. Most of the occurrences reported (68 per cent) were deemed by TSSA to be a result of improper or negligent work practices, specifically components damaged by machinery and equipment; equipment not maintained properly; and leaks and valves left half open. Most of the liquid fuels site incidents reported happened at gas stations [76.5 per cent in fiscal year 2022 (FY22) compared to 81.5 per cent in FY21].

In addition, there was a 16 per cent decline in the number of pipeline strikes compared to the previous reporting year, despite the fact that the province saw an increase in construction and excavation activities in fiscal year 2022 (FY22) compared to FY21 as pandemic-related restrictions eased. This reduction can be attributed to successful educational campaigns that have increased knowledge of excavation best practices to avoid pipeline strikes and TSSA's compliance support program offered to industry members with operations deemed high risk.

TSSA Compliance Support Program advisors continued to work diligently with regulated parties in the Fuels sector with operations deemed high risk to address their specific non-compliance issues. Of the 51 Fuels entities that accepted TSSA's offer of compliance support from the start of the program to the end of FY22, 88 per cent saw a reduction in risk scores. The risk score reflects the compliance of the entity and any associated incidents. Entities that are more compliant have lower risk scores.

Additionally, the number of fatalities in the sector decreased from three in FY21 to two in FY22. One of fatalities occurred due to the faulty installation of a propane fridge that caused excessive carbon monoxide (CO) release, and the other was caused by an explosion of a heat-treating appliance. TSSA inspectors and management carefully reviewed all evidence to assess root causes and lessons learned from incidents that involve serious injuries.

Other Initiatives

One of the Fuels Safety Program's most significant safety accomplishments in FY22 was the successful implementation of the second phase of TSSA's new IT business solution, Operations Analytics Safety Innovation System (OASIS). With the launch of Release 2, OASIS provides TSSA with real-time, trustworthy data for the Fuels Safety Program, which sets the stage for evidence-informed, risk-based decision making – a key component of TSSA's transformation into an Outcome-Based Regulator. As part of the OASIS implementation, a large amount of historical data was cleansed and migrated into the new database. The new platform also provides a higher degree of workflow automation which, in time, will reduce the processing and turnaround time for industry requests and applications.

Industry engagement was a top priority in FY22. Keeping industry apprised of safety issues and regulatory advancements and seeking input on TSSA programs and initiatives, the Fuels Safety team met with members of the Heating, Refrigeration and Air Conditioning Institute of Canada (HRAI) and presented at the Canadian Mechanical & Plumbing Expo (CMPX), North America's largest tradeshow for the mechanical, plumbing and HVACR industry. Topics of discussion at these events included TSSA's Outcome- Based-Regulator transformation, industry compliance standards, and the Trunk Slammers Awareness and Enforcement Campaign to deter unauthorized fuels work.

The Fuels Safety Program also remains focused on educating Ontarians and promoting public safety with a number of fuels-related initiatives designed to change behaviours. In the past year, TSSA's fuels public safety awareness programs included:

- CO Safety to increase awareness of the dangers of CO poisoning and how to prevent them
- Patio Heater Safety to address the hazards associated with the increased use of patio heaters by homeowners and restaurants due to the pandemic
- Spring Flooding Safety to proactively increase awareness of fuels-related hazards caused by flooding
- BBQ Safety in advance of the May long weekend to guide Ontarians on sensible and safe barbecuing practices
- Winter reminders to keep gas meters and fuel-burning appliance vents free from snow and ice
- "Trunk Slammers" Awareness to address the public safety issue of uncertified technicians and unregistered fuels contractors

TSSA will continue to educate Ontarians, partner with industry stakeholders and collaborate on future safety strategies and regulatory awareness initiatives.

Fuels Case Study:

Contractor Mechanically Unearths Pressurized Gas Line Without Obtaining Locates

Background

While driving by a residence in Windsor, an Enbridge Gas technician observed a pressurized gas line, regulator and meter laying across the yard. It was evident to the technician that the foundation and gas line had been exposed by mechanical excavation equipment, yet there were no signs of pipeline locates on the property.

Concerned about the public safety threat posed by the situation, the technician stopped to halt the excavation work. Due to the egregious nature of the unsafe act, the technician escalated the matter to his supervisor who reported the occurrence to TSSA. While no injuries were sustained as a result of the incident, the hazardous conditions were conducive to the increased risk of explosion, damage, injury, and death.

Gas line and meter above ground.

Conclusions

Upon investigation, TSSA determined that the homeowner hired a contractor to perform foundation work on the property. Due to lack of knowledge and research, the contractor was unaware of the legal requirement to obtain a valid pipeline locate before breaking ground and did not know that using mechanical equipment while digging within one metre of a pipeline is prohibited in Ontario.

TSSA Actions

TSSA educated the contractor on the applicable safety laws and issued multiple safety infraction orders. The contractor paid fines for his negligence.

While pipeline-strike incidents have decreased significantly compared to the previous reporting period and there have been no related permanent injuries or deaths in recent years, hitting a pipeline with pressurized gas is a significant risk to public safety, which is why Ontario has stringent laws around pipeline safety.

To increase awareness and prevent future risk, TSSA promotes safe digging practices among industry members and the public through speaking engagements and digital media advisories. In March 2022, TSSA teamed up with several safety partners – including the Ministry of Labour, Training and Skills Development, Ministry of the Environment, Conservation and Parks, Electrical Safety Association, Ontario One Call and others – for a series of six free online Dig Safe workshops hosted by Ontario Regional Common Ground Alliance and gave presentations outlining the parties responsible for obtaining valid locates.

Operating Engineers

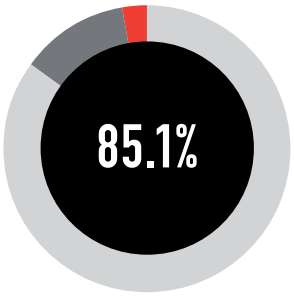
TSSA's Operating Engineers Safety Program registers, inspects and regulates plants that power Ontario with electricity, refrigeration, heating and cooling. TSSA is also responsible for the examination and certification of the professionals who manage power plant operations.

TSSA's comprehensive registration, inspection and certification activities ensure that operating engineers and operators have the skills and knowledge to safely manage, operate and maintain boilers, steam turbines and engines, gas compression plants, refrigeration plants, and associated mechanical and electrical systems in power generation, industrial processes and environmental plants.

3,189
REGISTERED POWER PLANTS

13,922
OPERATING ENGINEERS / CERTIFICATE HOLDER

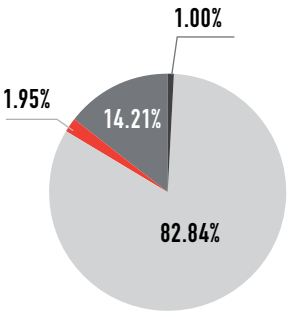
Low-Risk Sites



Incidents (FY22)

0	0	0
FATALITIES	PERMANENT INJURIES	NON-PERMANENT INJURIES

14 TOTAL INCIDENTS



Root Cause of Incidents (FY22)

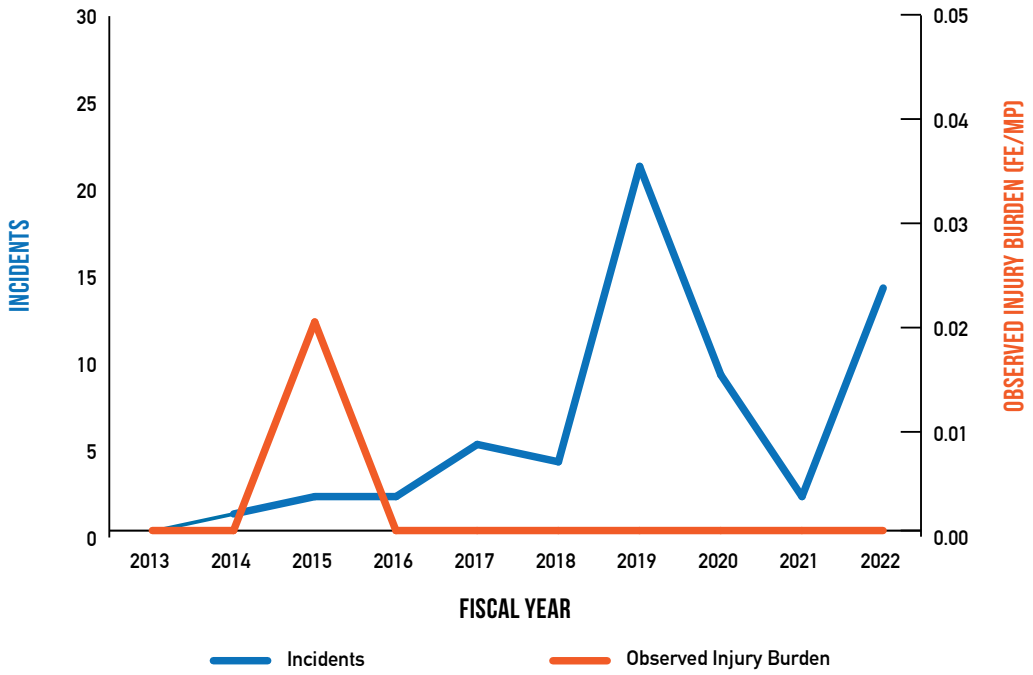
- NON-COMPLIANCE
- ROOT CAUSE NOT ESTABLISHED
- POTENTIAL GAPS IN REGULATORY SYSTEM
- EXTERNAL FACTORS

State of Public Safety in Ontario

Operating Engineers Safety Program

SUMMARY OF SAFETY NUMBERS				
REPORTING PERIOD	INCIDENTS	NON-PERMANENT INJURIES	PERMANENT INJURIES	FATALITIES
10-year average	6	0	0	0
2022	14	0	0	0
INCIDENTS CURRENTLY UNDER REVIEW				
REPORTING PERIOD	INCIDENTS	NON-PERMANENT INJURIES	PERMANENT INJURIES	FATALITIES
2022	5	0	0	0

Figure 10: 10-Year Safety Trends for Operating Engineers



There were 14 reported incidents in FY22 - an 86 per cent increase compared to two incidents reported last fiscal year.

There were no permanent injuries, non-permanent injuries or fatalities reported this fiscal year.

Operating Engineers Safety Program only had three permanent injuries and one non-permanent injury in the past 10 fiscal years.

The Observed Injury Burden (OIB) is reported based on the severity of injuries in that year. The OIB is the measure in fatality equivalent (FE) observed each year and normalized by the population of Ontario (FE/mp).

Figure 10 shows that the OIB for operating engineers spiked in 2015 due to permanent and non-permanent injuries reported in that program area.

The 2015 incident involved a mechanic who removed a pipe plug from a refrigeration plant which resulted in an ammonia release into the surrounding area. The cause of the incident was attributed to improper and negligent work practices on the part of the operator, which led to permanent and non-permanent injuries.

The OIB for FY22 was 0.00 FE/mp. This means there were no injuries or fatalities in FY22 and the past six fiscal years.

TOP SAFETY ISSUES FY22			
PLANT TYPES		**PLANT FUNCTION TYPES**	
Refrigeration Plant	24.79%	Manufacturing Industries	23.08%
Low Pressure Steam Plant	23.93%	Public Services	16.24%
High-Pressure Water tube Low-Water-Volume Power Plant	14.53%	Production Industries	13.68%

Since FY13, 62 of 86 incidents were considered to have non-compliance as a root cause (SIM II category). Some of these incidents included the following:

1. Refrigerant leaks at grocery stores
2. Mechanical failure at a compressor room
3. Ammonia leak at a warehouse/storage facility

HEALTH IMPACT			
OBSERVED		**POTENTIAL**	
0.002 FE/mp (10-year Average) Injury Burden	**0.00 FE/mp** (2022) Injury Burden	**0.001 FE/mpy** (2022) Risk of Injury or Fatality	**0.002 FE/mpy** (2021) Risk of Injury or Fatality

TSSA's RIF estimates the potential for injury or fatality by analyzing reported 10-year incident data and performing a Monte Carlo simulation. This provides a value that represents the potential of injuries based on past performance. The RIF for Operating Engineers reduced slightly this fiscal year compared to the last fiscal year.

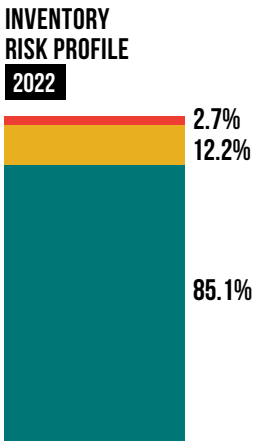
Risk Profile of Regulated Entities

TSSA estimates the relative risk of the operating plants it regulates by analyzing the data collected during inspection activities. Orders issued at a periodic inspection are risk assessed, and the regulated parties are given a specific amount of time to comply with safety orders based on the relative exposure that is tolerable for the potential hazard if the order's safety issue is not corrected on time. Based on this risk score, TSSA estimates that there were 2,628 high-risk OE Plants in Ontario in FY22.

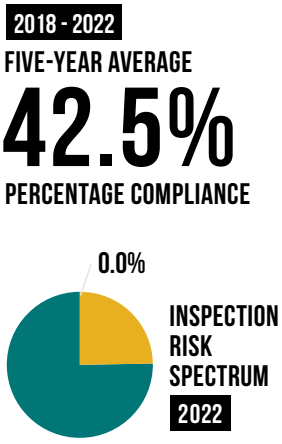
Of the 1,557 periodic inspections conducted in FY22, none found high-risk non-compliances which is the same as the last fiscal year.

The most common high-risk issue found during inspections was missing TSSA-registered seals.

The top compliance issues found by the number of risk orders issued were equipment not inspected and posted by an insurance company or TSSA, and safety concerns not being rectified.



This fiscal year, 2.7 per cent of all operating plants were deemed high risk compared to 2.5 per cent in the last fiscal year. This is due to the decrease in total active plants from 2,844 to 2,628.



GREEN
LOW RISK

Green indicates safety issues that are low risk and require periodic inspection.

YELLOW
MEDIUM RISK

Yellow indicates minor safety issues that are medium risk and require enhanced monitoring.

RED
HIGH RISK

Red indicates major safety issues that are high risk and require an actionable response.

Refer to Appendix C for further information on operating engineers.

Message from Ajay Raval, Operating Engineers Statutory Director

Ontario's Operating Engineers maintained stable levels of safety in fiscal year 2022 (FY22). Readers will note that the number of occurrences has increased from two in FY21 to 14 in FY22. It is important to consider, however, that historically, the 10-year average of occurrences has been six.

As previously reported, over the past three years, TSSA has observed dips in the number of occurrences, which we have attributed to COVID-19-related closures and lockdowns. In fact, prior to the emergence of COVID-19 in FY19, 22 occurrences were reported in the Operating Engineers Safety Program. Importantly, there were no injuries or fatalities reported. TSSA continues to assess and review all occurrence data to better understand the implications for monitoring and oversight of this sector.

Other Initiatives

FY22 saw Ontario plants show interest in achieving regulatory compliance by using a risk-based approach to safety, as TSSA received and approved several Alternate Rules Path 1 and Path 2 applications. Introduced in the previous fiscal year, Alternate Rules offer power plants two additional methods of achieving safety outcomes and compliance and enable applicants to use their own data and engineering calculations to demonstrate the safe staffing levels of their plants.

In June 2021, TSSA also introduced more flexibility to the certification process for Operating Engineers with Release 3 of Alternate Rules, which offers alternative methods of meeting certification requirements.