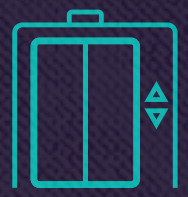
2024 Edition

Public Safety Report



TECHNICAL STANDARDS & SAFETY AUTHORITY

TSSA

Acknowledgments

On behalf of the Technical Standards and Safety Authority (TSSA), we are pleased to present this year's edition of the Public Safety Report for the fiscal year 2024 (May 1, 2023 - April 30, 2024); hereinafter referred to as FY24.

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

- Boilers and Pressure Vessels and Operating Engineers
- Elevating Devices (Elevators, Escalators and Passenger Ropeways and Ski Lifts) and Amusement Devices
- 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.

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 have been instrumental in developing this report, as well as the Communications and Stakeholder Relations team for reviewing and supporting the drafting of the report. TSSA would like to especially acknowledge the Strategic Analytics Team 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.

Contents

Message from TSSA Directors

Ontario's population has seen significant growth in the past 10 years and the industries that TSSA regulates are working hard to ensure they remain safe. TSSA plays a critical role in ensuring that public safety continues to be a priority by partnering with regulated parties to reduce the risk of harm for people in Ontario. This year's safety results demonstrate this continued commitment is indeed having its intended outcome.

While the population of Ontario grew by 16% to 16 million[1] people since 2015, the incident rates have increased at a lower rate than population rates – indicating a relative improvement in safety. From 2015-2024 **the rate of incidents per million people has been decreasing** – from 389 incidents per million people in 2015 to **384 incidents per million people in 2024**.

At the same time, there has been a steady decrease in permanent injuries on regulated devices across Ontario – **with 32% fewer permanent injuries reported in 2024 compared to 2015 (normalized by population).**

The reduction of harm is most notable in fuels, where the number of **fuels-related incidents** (excluding pipeline strikes) **have decreased** from 81 incidents per million people in 2015 to **59 incidents per million people in 2024.**

As TSSA introduces Outcome-Based Regulator initiatives in more program areas, we are starting to track the relative impact of these initiatives on safety and compliance. For example, In May 2023, TSSA introduced compliance standards for escalators as a tool to identify key areas of high risk. The **pass rate for passenger elevators** in FY 2024 was **64%**.. Similarly, in September 2023, TSSA implemented compliance standards during its **periodic audits of Heating Contractors**. The **pass rate for 2024 was 90%.** These results point to the positive impact to improve compliance and safety practices by using a risk-based approach for periodic inspections.

Viola Dessanti

Director, Strategic Analytics

AJ Kadirgamar

Director, Elevating and Amusement Devices and Ski Lifts Safety Program

Kelly Hart

Director, Fuels Safety Program

Kim Semper

Director, Boilers and Pressure Vessels and Operating Engineers Safety Program

Phil Simeon

Director, Regulatory Policy

[1] Population estimates on July 1, by age and gender (statcan.gc.ca) and Ontario Demographic Quarterly Highlights 2024, accessed June 14, 2024

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.

State of Safety in Ontario

All Programs Combined

Total Number of Incidents	6,109
Total Number of Non-Permanent Injuries	1,571
Total Number of Permanent Injuries	44
Total Number of Fatalities	4

Incidents, Injuries and Fatalities

In 2024, there was an increase in the total number of incidents and non-permanent injuries compared to the 10-year average. However, while the population of Ontario grew by 16% to 16 million[2] people since 2015, the incident rates have increased at a lower rate than population rates – indicating a relative improvement in safety. From 2015-2024 **the rate of incidents per million people has been decreasing** – from 389 incidents per million people in 2015 to **384 incidents per million people in 2024.**

At the same time, there has been a steady decrease in permanent injuries on regulated devices across Ontario – **with 32% fewer permanent injuries reported in 2024 compared to 2015 (normalized by population).**

Incidents

Reporting Period	*Incidents*	*Non-Permanent Injuries*	*Permanent Injuries*	*Fatalities*
10-year average	5,492	1,345	48	3
2024	6,109	1,571	44	4

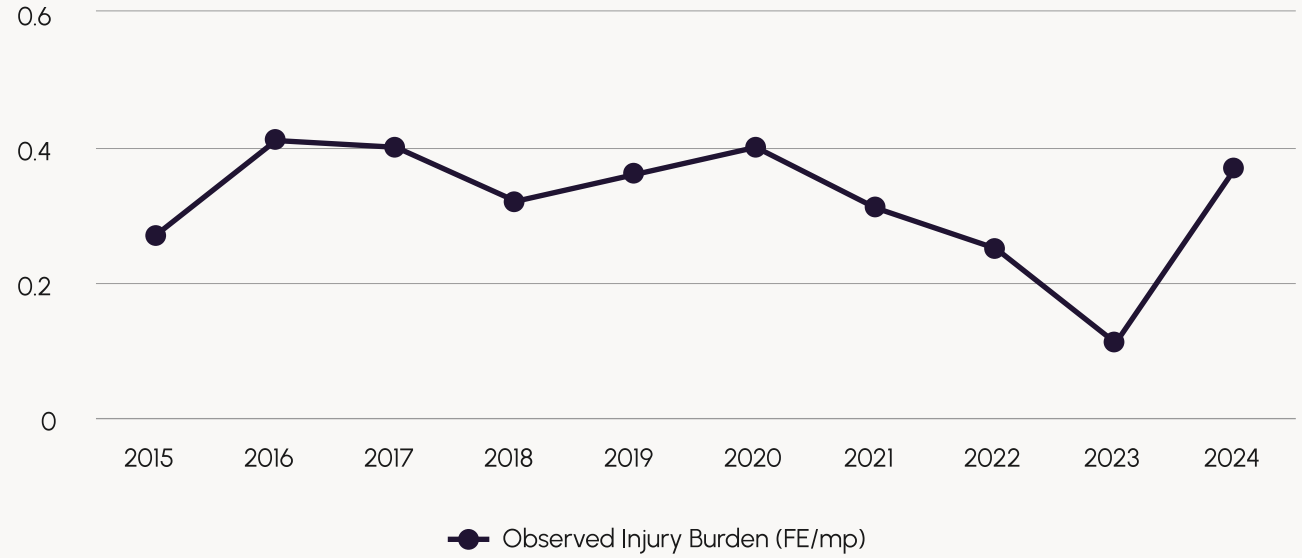
Incidents Currently Under Review*

Reporting Period	*Incidents*	*Non-Permanent Injuries*	*Permanent Injuries*	*Fatalities*
2024	403	15	2	0
2023	38	4	4	0

*Open incidents as of 2024-05-01

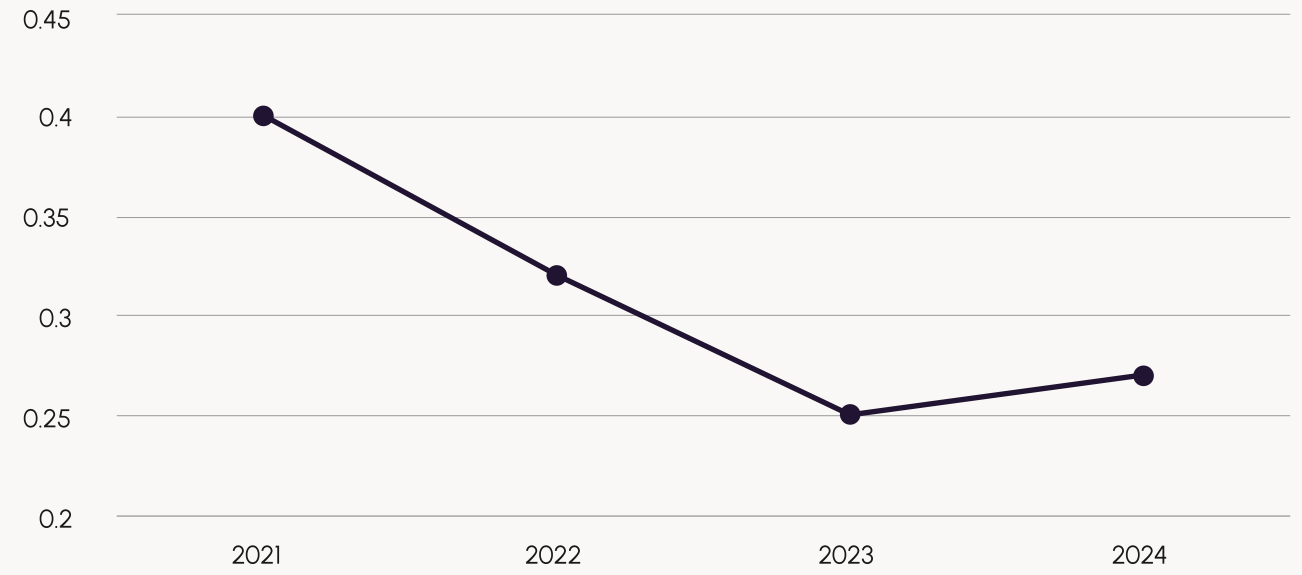
[2] Population estimates on July 1, by age and gender (statcan.gc.ca) and Ontario Demographic Quarterly Highlights 2024, accessed June 14, 2024

Figure A1: 10-Year Observed Injury Burden Trend for All Programs in Ontario



Observed Injury Burden has increased from fiscal year 2023 due to a doubling in fatalities and an increase in non-permanent and permanent injuries; however, it's worth noting that the incident and injury rates remain below the 10-year averages.

Figure A2: Risk of Injury or Fatality for All Programs (2021-2024)



TSSA's Risk of Injury or Fatality (RIF) estimates the potential for injury or fatality by performing a Monte Carlo simulation[3] on incident data. In FY24 it calculated that the RIF in all program areas would be 0.27 FE/mpy (Fatality Equivalent per million people per year). The slight uptick in the RIF from 2023 to 2024 is driven by the 3 fatalities in the fuel safety program area this year.

[3] J.E Gentle. "Computational Statistics." In International Encyclopedia of education, third edition (2010): 93-97. A Monte Carlo simulation is used to model the probability of different outcomes in a process that cannot easily be predicted due to the intervention of random variables. It is a technique used to understand the impact of risk and uncertainty.

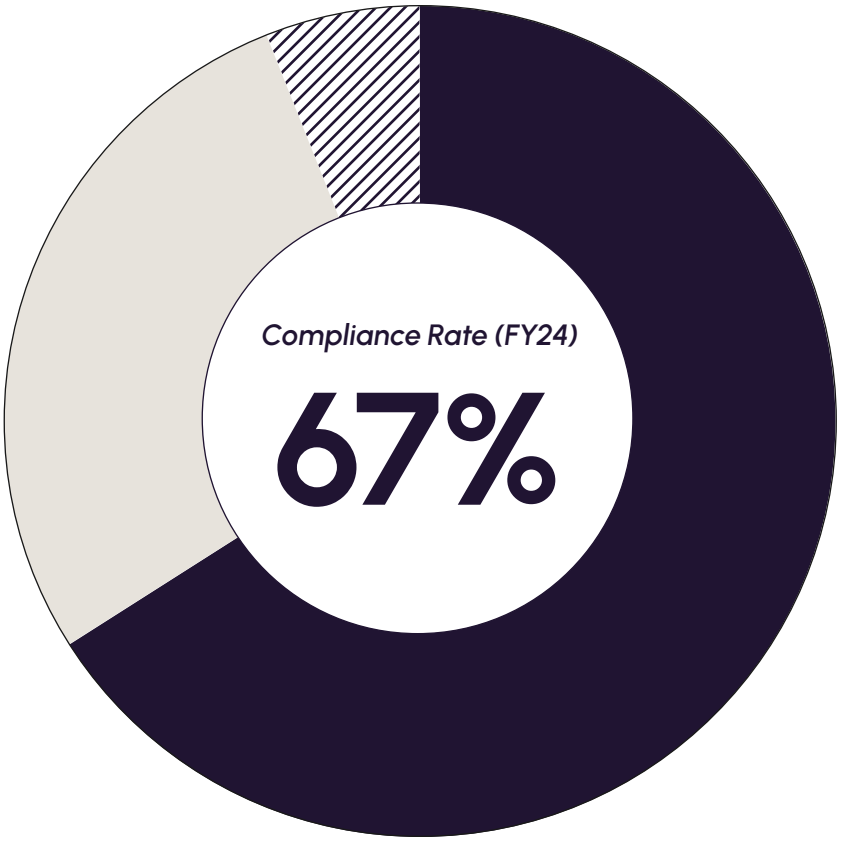
Inspection Results

TSSA conducts a variety of inspection types including periodic and non-periodic inspections every year to assess compliance with regulatory and code requirements. This is a critical step in the safety value chain that provides TSSA with critical data used for analysis and reporting. For example, data collected at inspections is used to identify areas where there are higher probabilities of harm and to inform TSSA's regulatory responses to these scenarios.

Across all programs, 67% of inspections have passed and 27% failed. TSSA considers an inspection failed if a high-risk issue is found. When periodic inspections fail, the owner/operator is given 14 days to comply before a TSSA inspector follows-up with another inspection to ensure compliance. TSSA monitors patterns of high-risk non-compliances to identify opportunities to leverage education, compliance support and partnership to improve compliance.

Figure A3: Periodic Inspection Results

- ***67%:*** *Inspections passed*
- ***27%:*** *Inspections failed*
- ***6%:*** *Other outcomes*



Inspections Conducted in Fiscal Year 2024

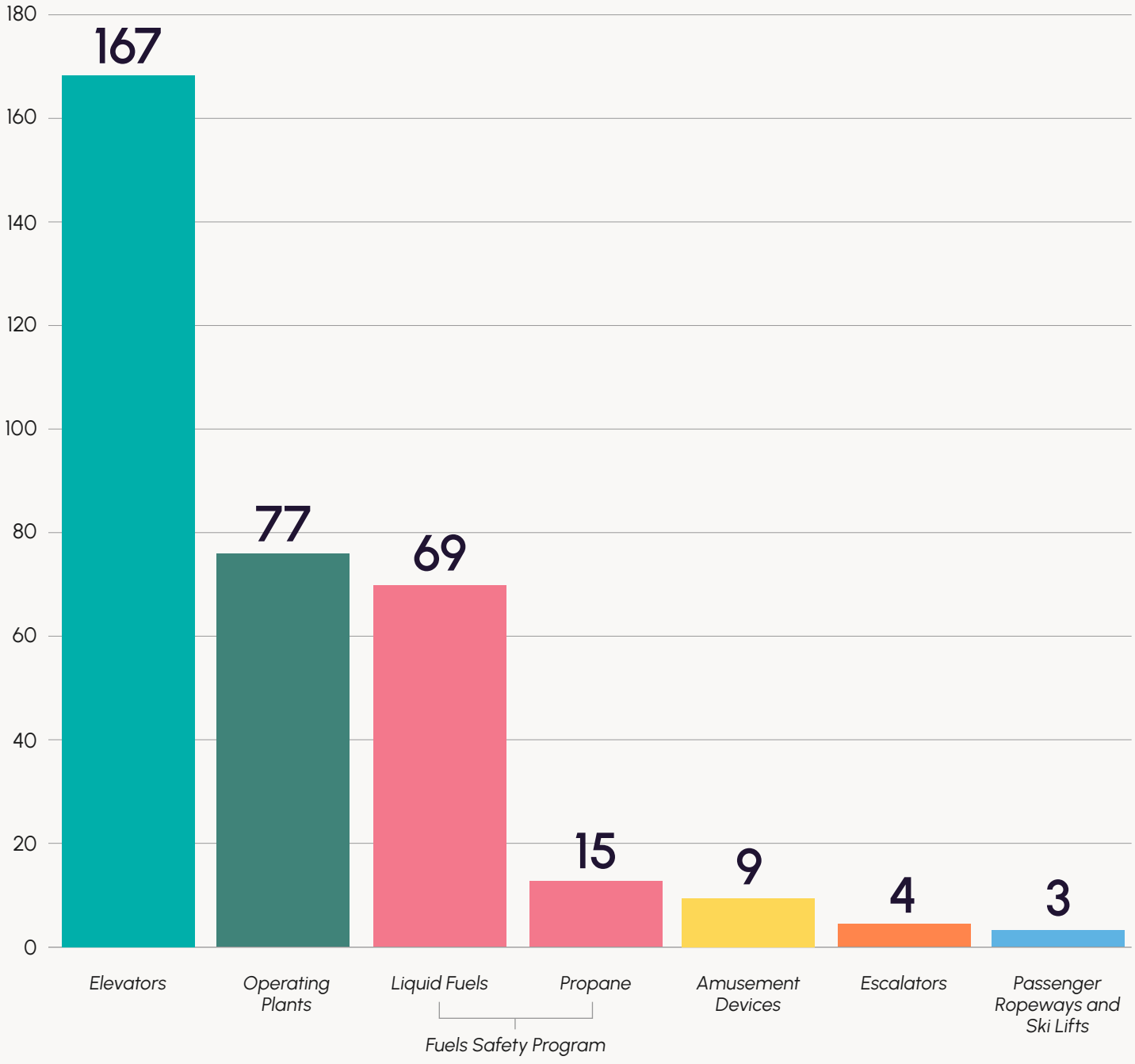
Inspection Type	*Full Compliance*	*Non-Compliances Found*	*Other*	*Grand Total*
Initial Inspection	145	157	0	302
Alteration Inspection	2,052	438	20	2,510
First/Install	8,433	1,494	143	10,070
Inspection FA/Var/Info	1,149	96	14	1,259
Periodic Inspections	15,940	6,487	409	22,836
Other Inspections	14,033	3,730	6,916	24,679
All Programs Total	**41,752**	**12,402**	**7,502**	**61,656**

TSSA rolled out the Risk-Based Scheduling for periodic inspections in 2017 and is currently in the process of updating the approach to a more data-driven predictive model. The percentage of inventory considered high-risk reported here is based on the 2017 model.

Figure A4: High-risk Devices and Sites for Elevators, Escalators, Amusement Devices, Ski Lifts, Liquid Fuels, Propane and Operating Plants in FY24

Number of High-risk Devices and Sites **344**

Percentage of High-risk Inventory **1.74%**



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.

At a Glance

Compliance Rate FY24

77%

Number of Permitted Rides

811

Approved Engineering Designs

98

Operators

217

Certified Mechanics

411

Incidents, Injuries and Fatalities

In 2024, there was a noticeable increase in the total number of incidents and non-permanent injuries compared to the 10-year average. Specifically, the number of incidents rose from an average of **802 to 1,062, marking an increase of approximately 32.4%.** Similarly, non-permanent injuries also saw a **rise from an average of 741 to 986, indicating an increase of about 33.1%.**

The **number of permanent injuries in FY24 decreased moderately** compared to the 10-year average, dropping from 22 to 21. This represents a decrease of **approximately 4.5%.**

TSSA has been partnering with AD owners and operators to improve reporting practices in the sector, while at the same time improving processes internally to improve the quality of incident data. This might have contributed to increases in counts of incidents. Another consideration is that the 10-year average for incidents in this sector decreased significantly in 2021-2022 due to COVID related closures. In fact, the count of incidents in 2024 is lower than incidents in 2020 (1,380) and 2019 (1,197).

Incidents

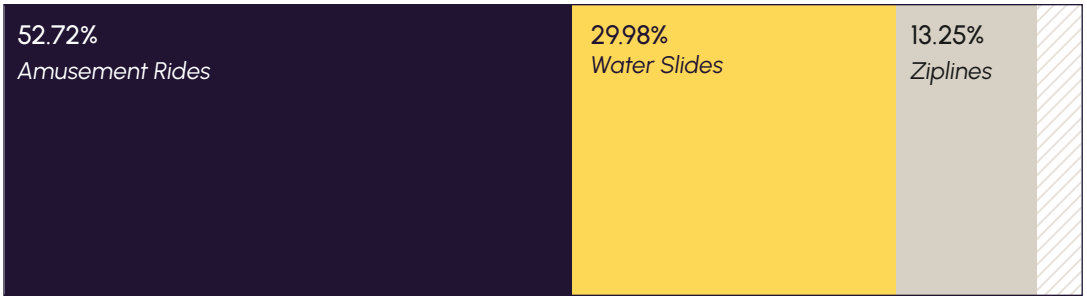
Reporting Period	*Incidents*	*Non-Permanent Injuries*	*Permanent Injuries*	*Fatalities*
10-year average	802	741	22	0
2024	1,062	986	21	0

Incidents Currently Under Review*

Reporting Period	*Incidents*	*Non-Permanent Injuries*	*Permanent Injuries*	*Fatalities*
2024	6	4	2	0

*Open incidents as of 2024-05-01

Top Amusement Device Types by Number of Incidents (2015-2024)



Other Amusement devices and rides (go-karts, inflatables etc) - 4.05% ↗

Incidents per 100 Permitted Amusement Devices

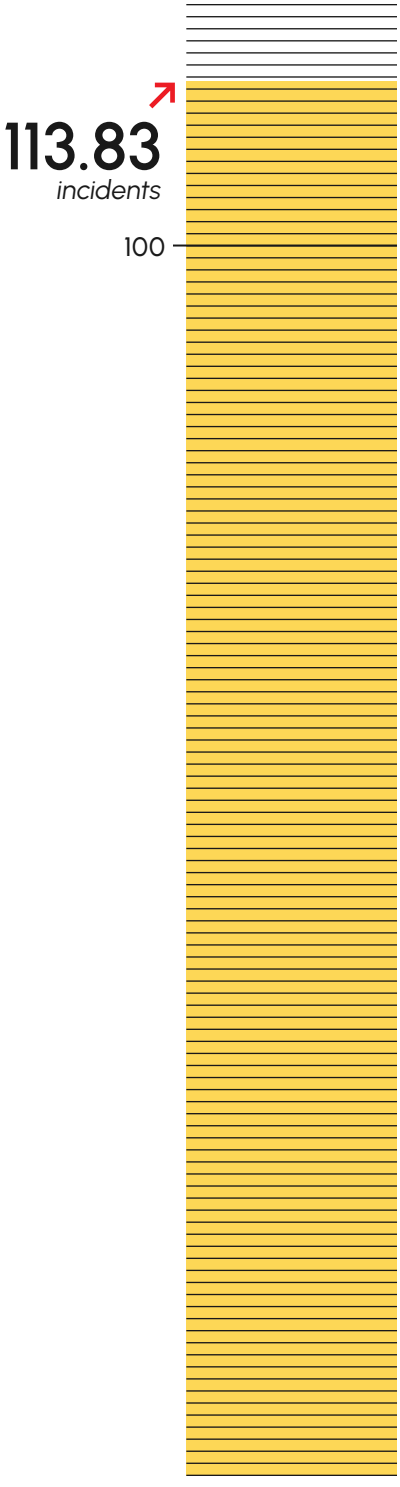
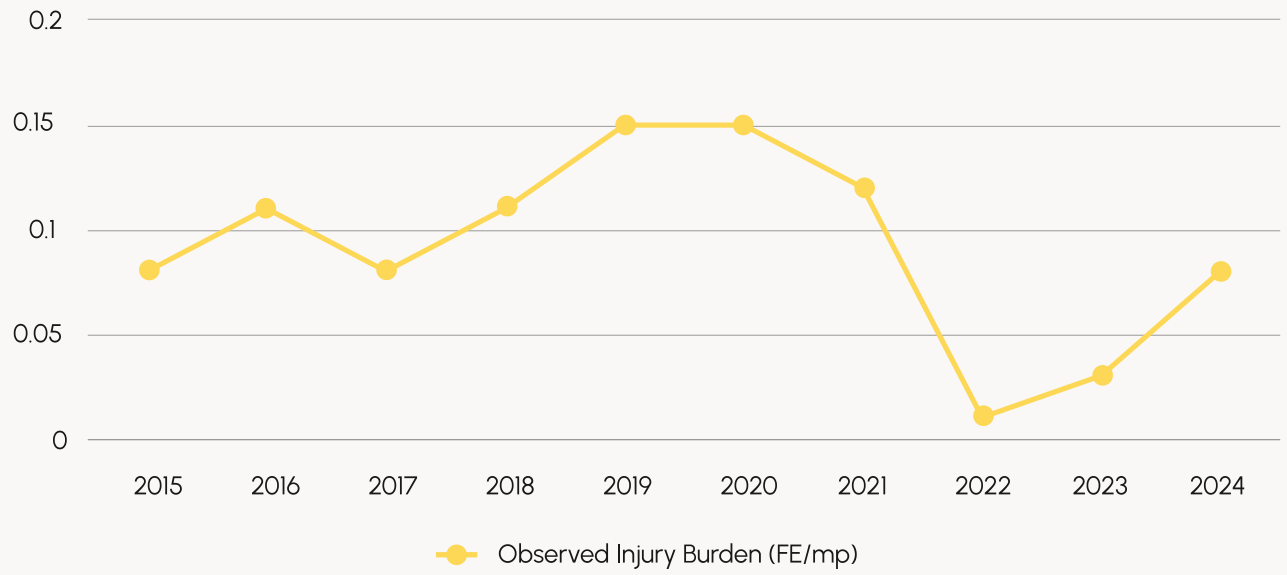
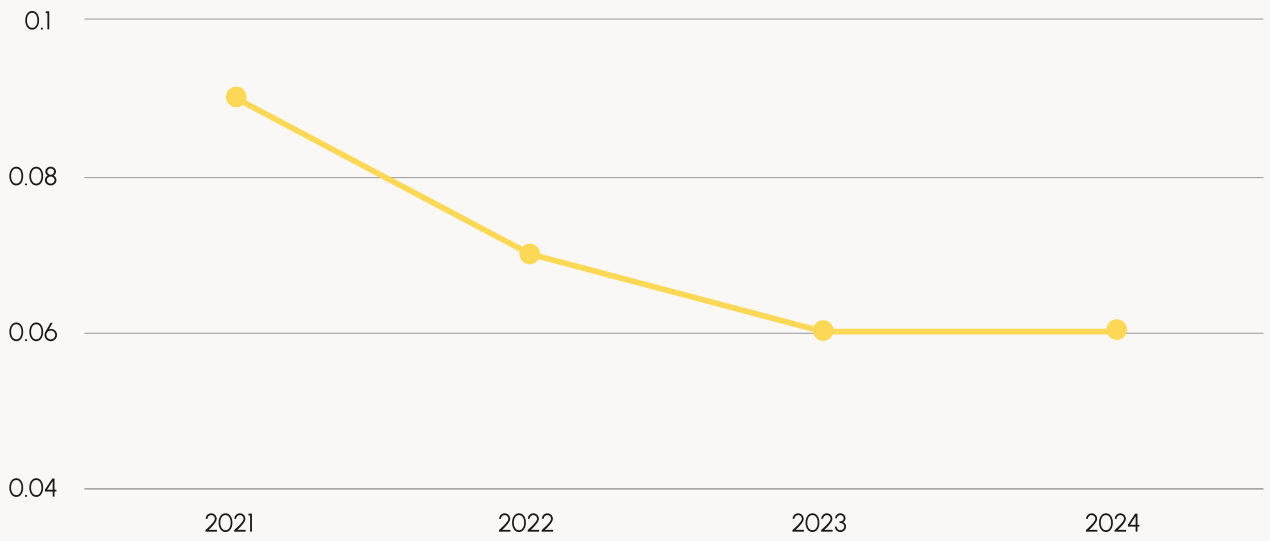


Figure B1: 10-Year Observed Injury Burden Trend for Amusement Devices in Ontario



Over the past 10 years, while remaining at a low level, the Observed Injury Burden in the amusement devices program has experienced fluctuations. There was a notable drop in injuries and fatalities due to lower use of amusement rides during the pandemic. Since 2022, it has been trending back to the average level before the pandemic. Notably, the RIF has been declining since 2021.

Figure B2: Risk of Injury or Fatality for Amusement Devices (2021-2024)



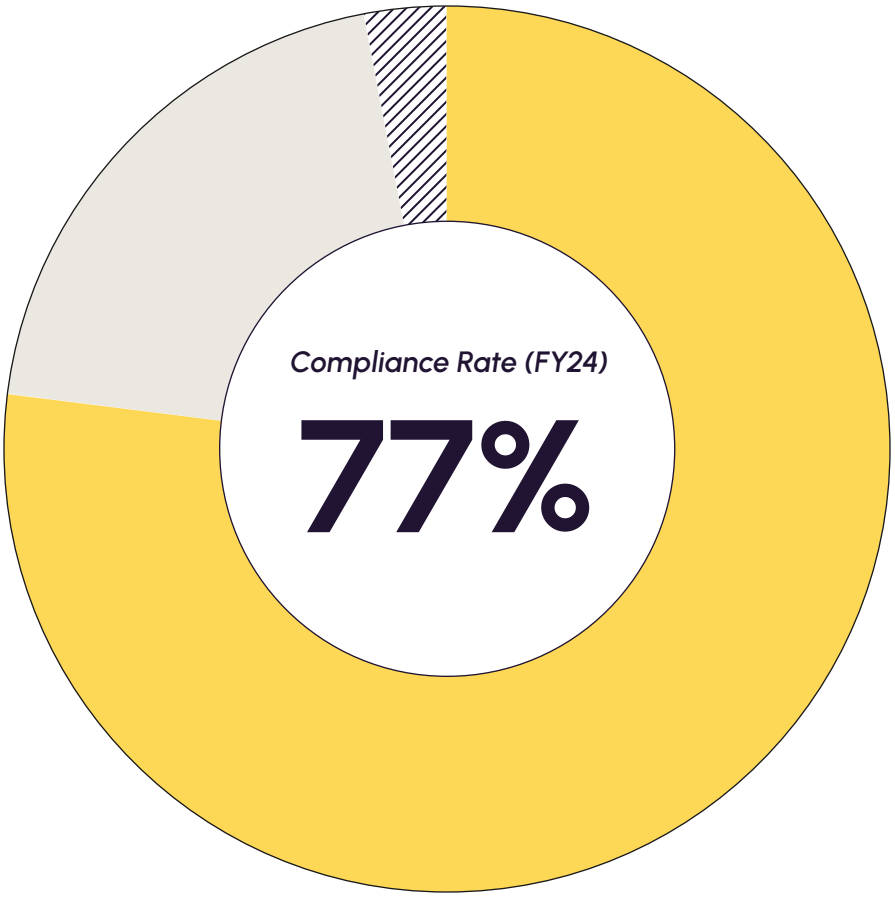
TSSA's Risk of Injury or Fatality (RIF) estimates the potential for injury or fatality by performing a Monte Carlo simulation on 10-year historical data. In FY24 it calculated that the RIF in amusement devices would be 0.06 FE/mpy (Fatality Equivalent per million people per year).

Inspection Results

TSSA conducts a variety of inspection types including periodic and non-periodic inspections every year; the below is a breakdown of the results of periodic inspections conducted in FY24.

Figure B4: Periodic Inspection Results

- ***77%:*** *Inspections passed*
- ***20%:*** *Inspections failed*
- ***3%:*** *Other outcomes*



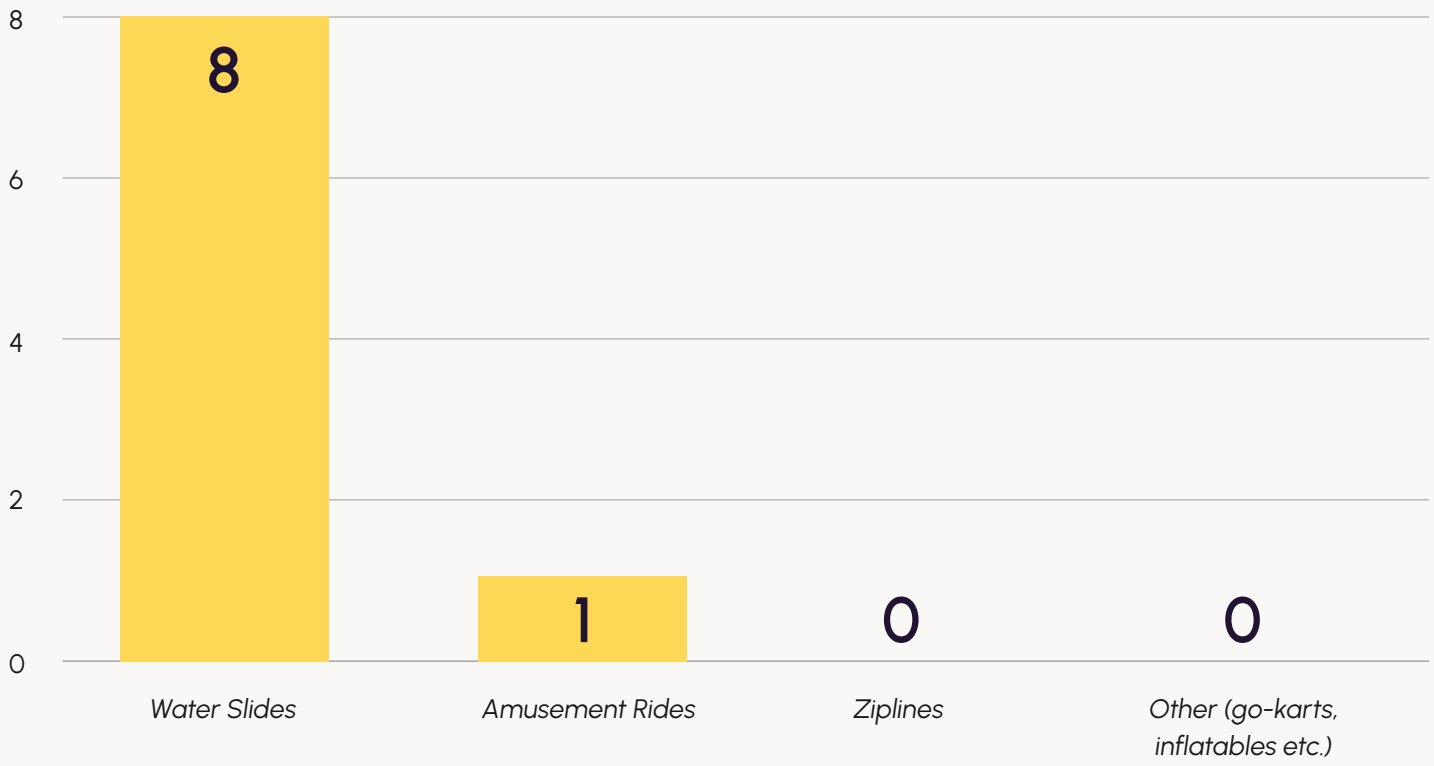
Inspections Conducted in Fiscal Year 2024

Inspection Type	*Full Compliance*	*Non-Compliances Found (any risk)*	*Other*	*Grand Total*
AD Inspection - Var/Info	5	0	0	5
AD Alteration Inspection	34	1	0	35
AD First/Install	135	13	1	149
AD Other Inspection	129	21	4	154
AD Periodic	2,094	157	52	2,303
Grand Total	**2,397**	**192**	**57**	**2,646**

Figure B4: High-risk Amusement Devices in FY24

Number of High-risk Amusement Devices **9**

Percentage of High-risk Inventory **0.28%**



Top High-risk Issues from Periodic Inspections (2024)

Compliance Issue	*Total Number of Orders Issued*	*Percentage of Total Number of Orders Issued*
Owners must ensure that certified mechanics perform periodic maintenance on their devices and keep records of this maintenance in associated log books	**83**	**7.69%**
Secure fasteners in an approved manner	**62**	**5.75%**
Ensure that all cords, cables and other electrical equipment be free of any physical damage	**43**	**3.99%**

Case Study: Ride Patron Injured Due to a Lapse in Safety Checks

Stock image of amusement park

Background

During a fun fair in Southern Ontario, a serious incident occurred on a high-speed revolving amusement ride. A male patron was ejected from the ride at or near its full speed, resulting in a head injury and loss of consciousness. The injured rider was promptly transported to the hospital for medical treatment.

The amusement device involved was a flat, circular ride with elevated sections and 20 passenger-carrying units (PCUs), accommodating one to three riders each. When multiple patrons occupy a PCU, the heaviest patron is seated on the outside. The device has deep well fibreglass seats with lap bar restraints that attendants must verify are locked. Once each PCU's lap bar is secured, the attendants or operators stand on the perimeter to observe the ride for any unsafe conditions or patron behaviour.

TSSA Analysis and Action

TSSA investigated the incident by reviewing video footage, the ride's safety procedures and other available evidence. Videos revealed that while the lap bar restraint latch appeared locked at the ride's start, it was unlocked during the incident. The injured male, seated on the outside with a smaller companion in a PCU, had his hands raised and was not holding onto the lap restraint. The ride, rotating counterclockwise at approximately 12 revolutions per minute, ejected the patron, who then crashed onto the perimeter fencing.

TSSA's analysis identified a procedural lapse: while attendants were trained to ensure the lap restraints were securely locked, they did not conduct a second check before the ride began. Without this additional safety check, the rider's latch was unlocked, and this went unnoticed by any attendants.

From 2015 to 2024, most safety issues in the amusement ride program area occurred on amusement rides (52.72%), followed by water slides (29.98%), ziplines (13.25%), and others, including go-karts and inflatables (4.05%). During periodic inspections conducted in FY2024, TSSA issued 62 high-risk orders relating to fasteners not being secured in an approved manner, accounting for about 6% of the total orders that were issued.

TSSA's Manager, Investigations, Cy Gray said, "As this incident shows, when operated effectively, the built-in safety measures, such as the lap bar restraints, could act as critical safeguards against injury. It is important that amusement ride owner and operators continue to review and enhance safety procedures to ensure a safe and enjoyable experience for all riders."

Boilers and 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.

At a Glance

Certificate of Competency Holders

181

Certificate of Authorization Holders

2,847

Certificates of Inspections Issued

16,885

Incidents, Injuries and Fatalities

In the past 10 years, we have seen a **stable state of safety in the program area and the number of injuries is in the single digits**. TSSA continues to identify opportunities to improve data collection in BPV, specifically around reporting for incidents and near-misses.

Incidents

Reporting Period	*Incidents*	*Non-Permanent Injuries*	*Permanent Injuries*	*Fatalities*
10-year average	76	0	0	0
2024	67	0	0	0

Incidents Currently Under Review*

Reporting Period	*Incidents*	*Non-Permanent Injuries*	*Permanent Injuries*	*Fatalities*
2024	10	0	0	0
2023	3	0	0	0

*Open incidents as of 2024-05-01

Incidents per 100 Authorized Boilers and Pressure Vessels (BPVs) in FY24

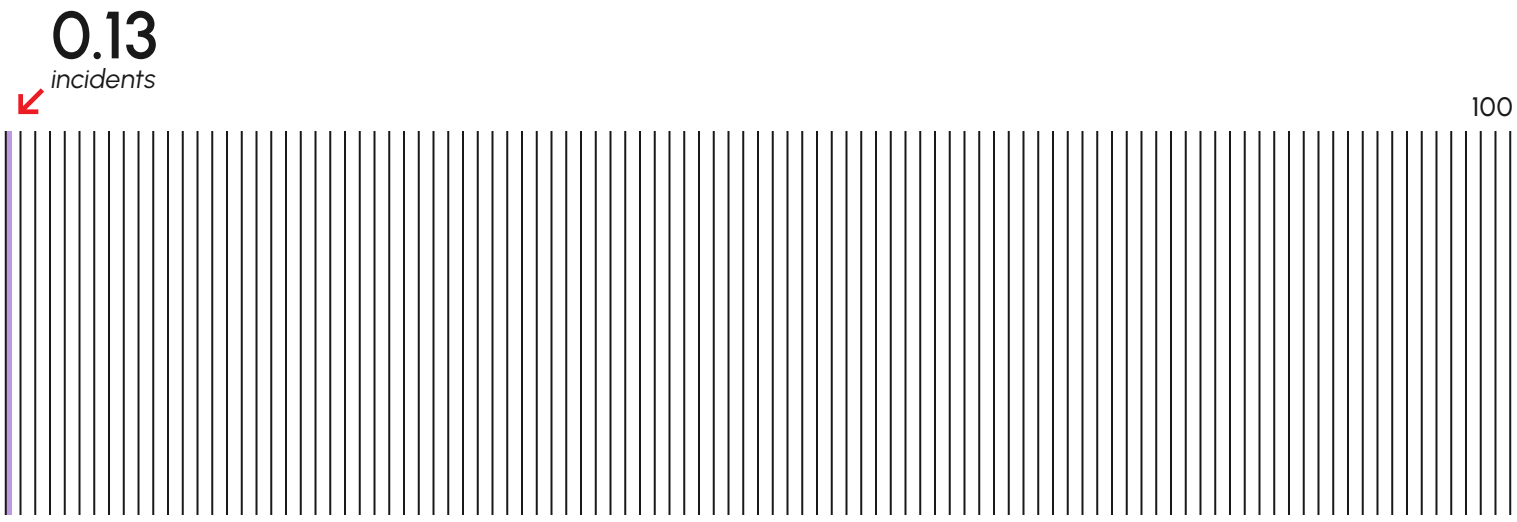
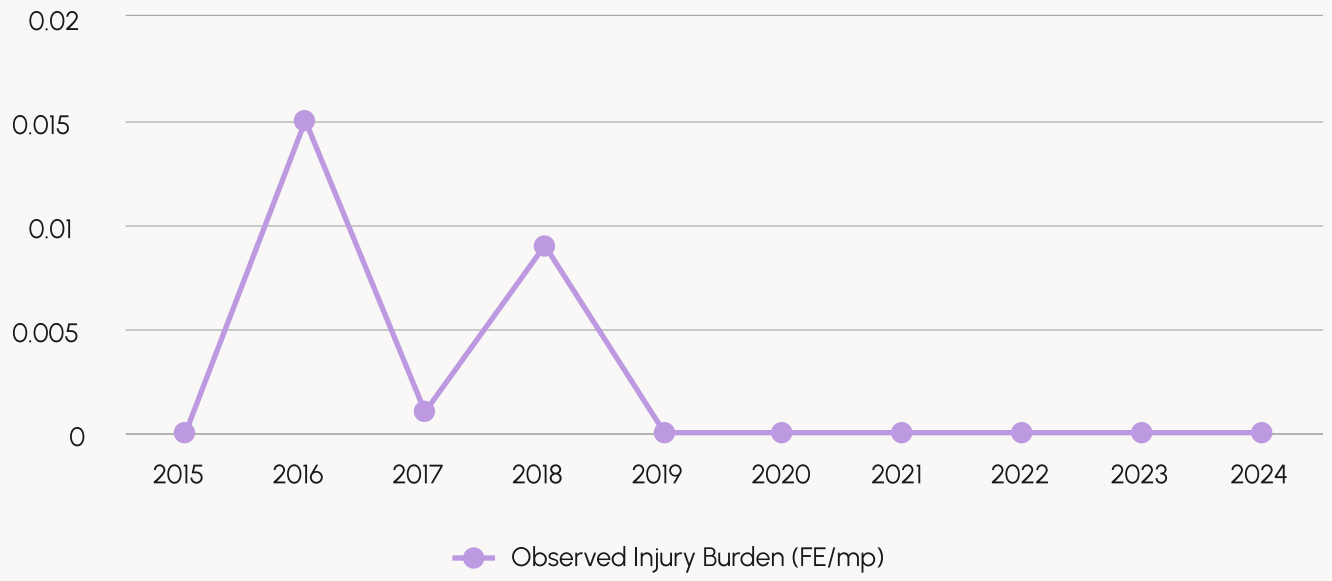
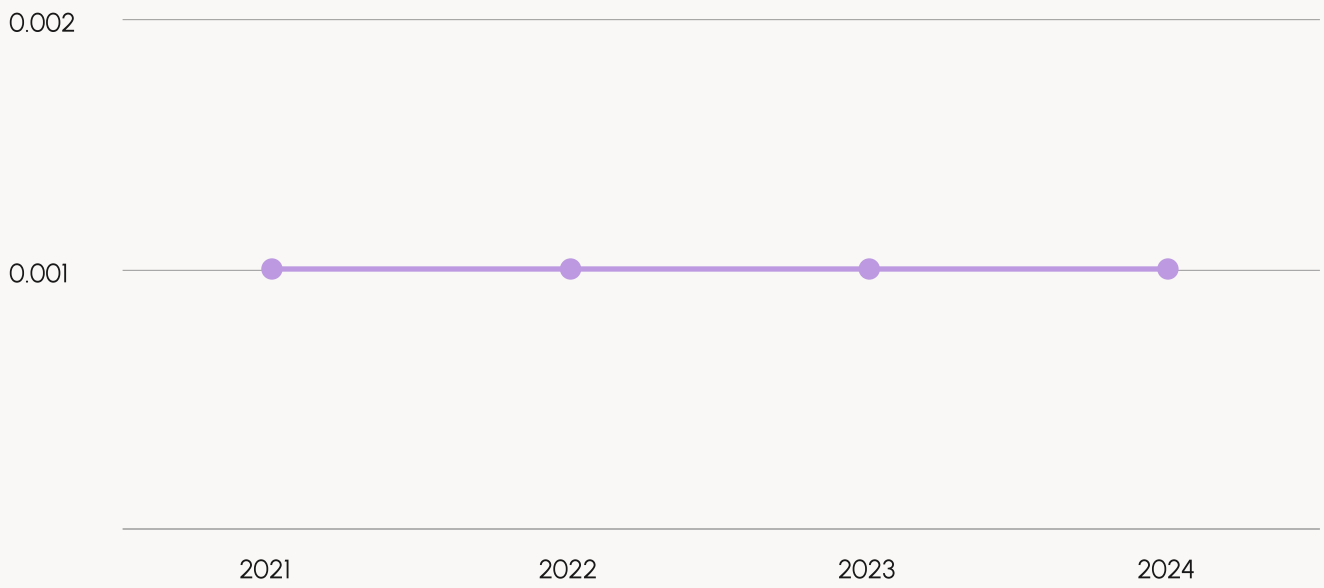


Figure C1: 10-Year Observed Injury Burden Trend for Boilers and Pressure Vessels in Ontario



The Observed Injury Burden reached its peaks in 2016 and 2018, with two injuries and one injury recorded respectively in these years.

Figure C2: Risk of Injury or Fatality for Boilers and Pressure Vessels (2021-2024)



TSSA's Risk of Injury or Fatality (RIF) estimates the potential for injury or fatality by performing a Monte Carlo simulation on 10-year historical data. In FY24 it calculated that the RIF in boilers and pressure vessels would be 0.001 FE/mpy (Fatality Equivalent per million people per year).

Inspection Results

TSSA conducts a variety of inspection types including periodic and non-periodic inspections every year; the below is a breakdown of inspections conducted in FY24.

Inspections Conducted in Fiscal Year 2024

Inspection Type	*Full Compliance*	*Non-Compliances Found (any risk)*	*Other*	*Grand Total*
Other Inspections	79	4	3	86
Periodic	1,513	21	32	1,566
Inspection & Others	668	0	1,492	2,160
First or Install	4,008	313	92	4,413
Fabrication	8,437	40	421	8,898
Grand Total	**14,706**	**378**	**2,050**	**17,134**

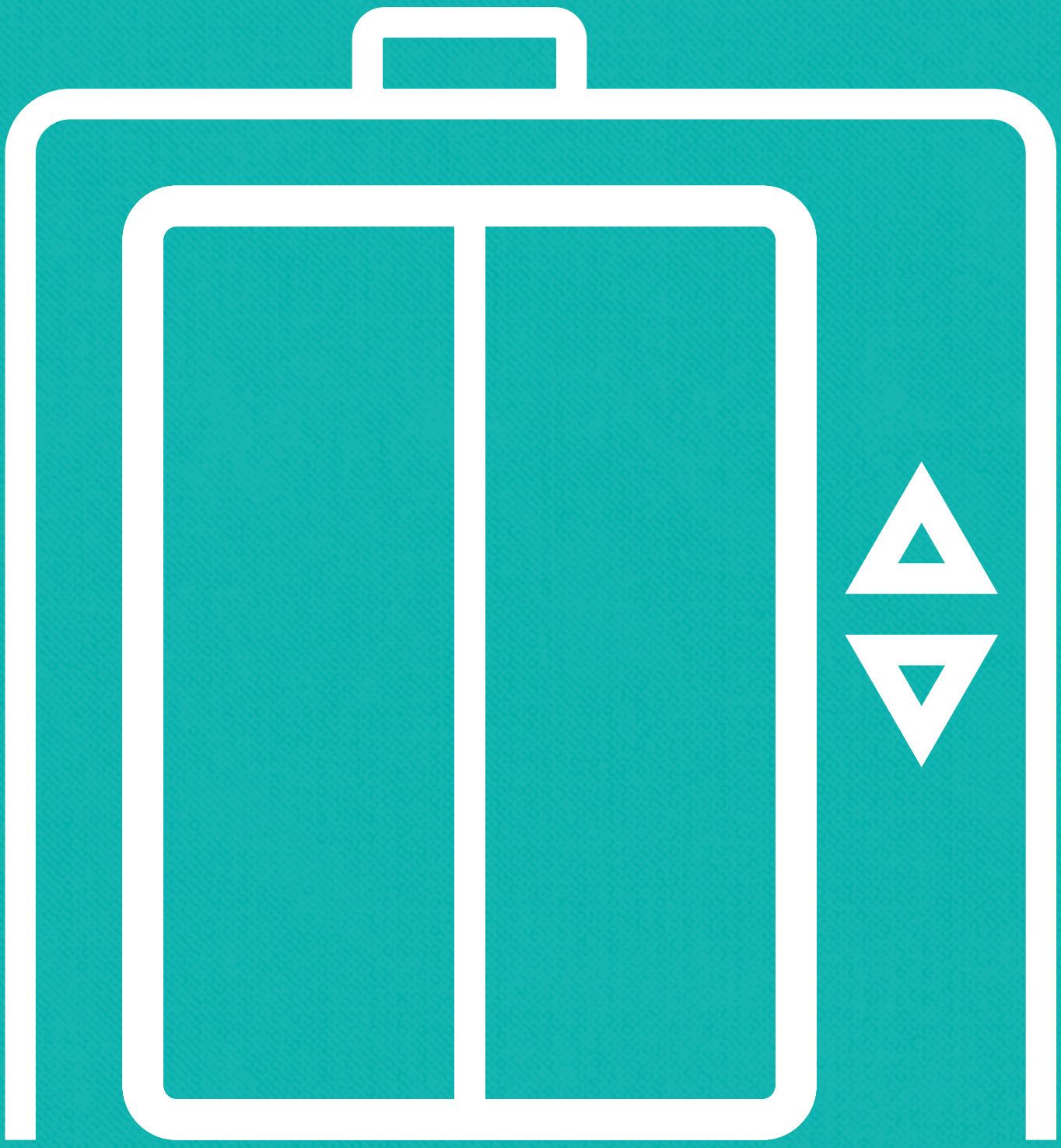
The majority of licensed BPVs in the province are periodically inspected by third-party insurance inspectors who are required to submit a record of inspection to TSSA. TSSA inspectors conducted 1,566 periodic inspections in 2024.

Top High-risk Issues from Periodic Inspections (2024)

Compliance Issue	*Total Number of Orders Issued*	*Percentage of Total Number of Orders Issued*
Equipment not serviced in accordance with maintenance lists and manufacturer's recommendations	**3**	**42.86%**
Equipment not maintained in safe working condition	**1**	**14.29%**
Pressure relief device is inadequate	**1**	**14.29%**

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.

At a Glance

Compliance Rate FY24

Elevators

65%

Number of Authorized Elevators

64,280 *All types*

48,064 *Passenger Elevators*

16,216 *Non-Passenger Elevators*

Registered Contractors

ED Program

145

Certified Mechanics

ED Program

4,717

Approved Engineering Designs

Elevators

2,213

Owners

Elevators

22,850

Incidents, Injuries and Fatalities

Over the past 10 years we've **observed fluctuations which point toward an increased number of reported incidents in this area**. It could be influenced by factors such as increased elevator usage due to population growth in the province and improved reporting mechanisms. TSSA estimates an increase of 1,500 elevators per year.

Incidents

Reporting Period	*Incidents*	*Non-Permanent Injuries*	*Permanent Injuries*	*Fatalities*
10-year average	659	116	7	1
2024	882	85	5	0

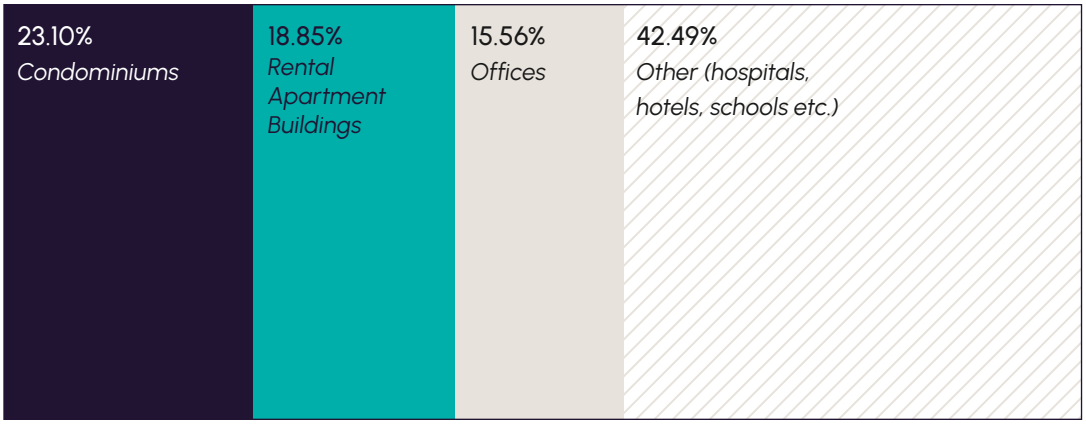
Incidents Currently Under Review*

Reporting Period	*Incidents*	*Non-Permanent Injuries*	*Permanent Injuries*	*Fatalities*
2024	31	10	0	0
2023	11	3	1	0

*Open incidents as of 2024-05-01

Top Elevator Building Types by Number of Incidents (2015-2024)

The number of incidents is higher in condominiums and rental apartments due to the higher number of elevator usage at these residential buildings.



Incidents per 100 Elevators in Ontario in FY24

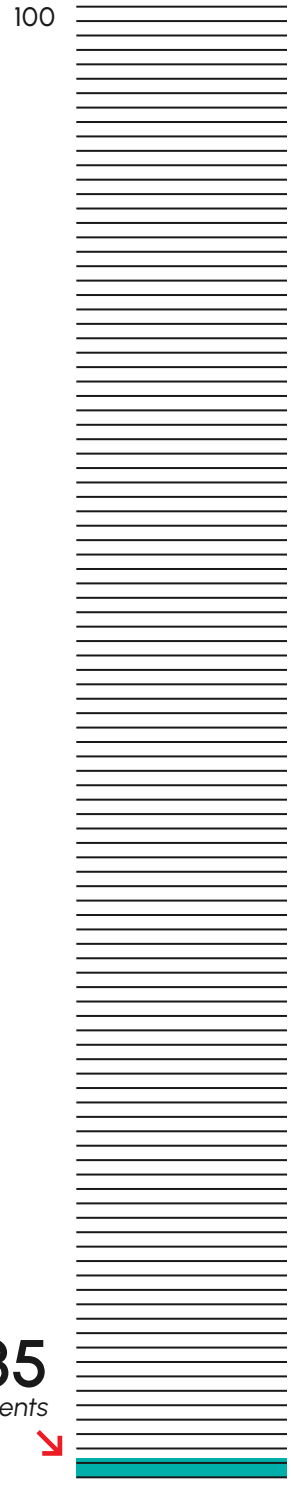
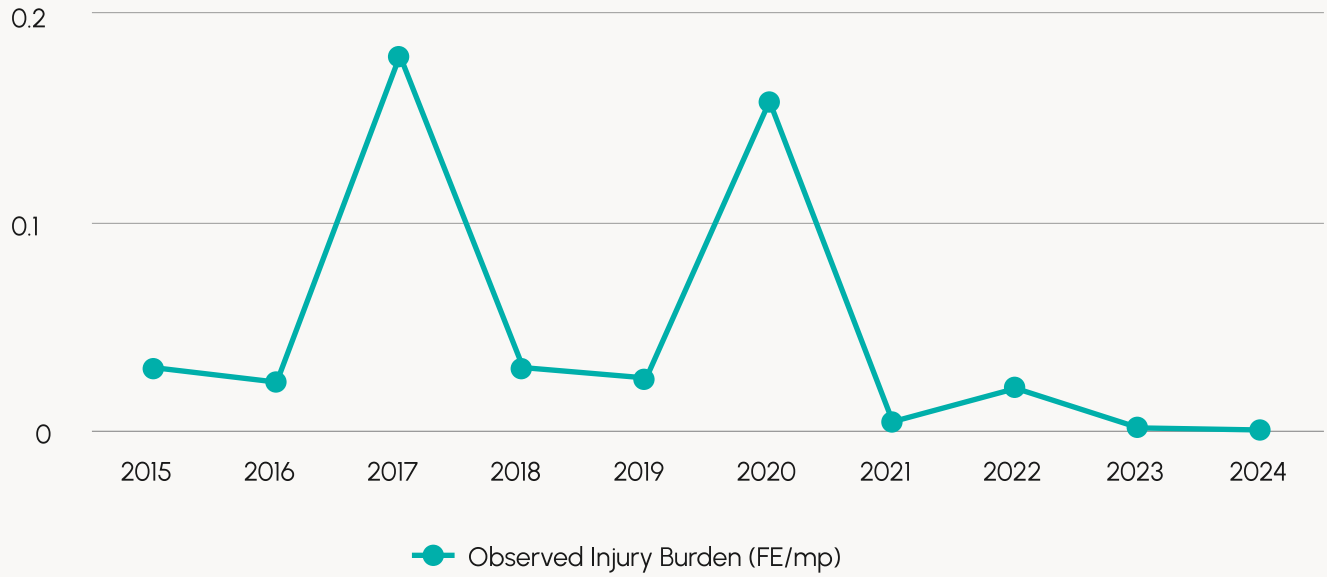
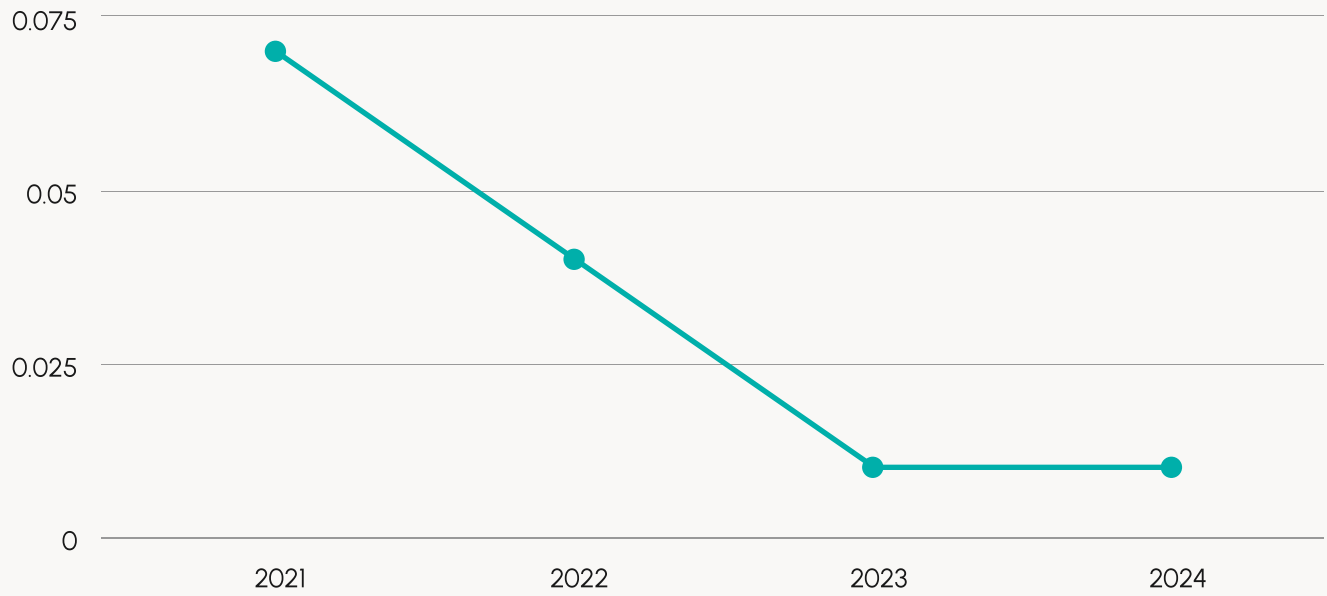


Figure D1: 10-Year Observed Injury Burden Trend for Elevators in Ontario



Non-permanent and permanent injuries have fluctuated while fatalities remained low in the past 10 years in Ontario; the Observed Injury Burden – which measures the relative severity of injuries - indicates an overall safety improvement.

Figure D2: Risk of Injury or Fatality for Elevators (2021-2024)



TSSA's Risk of Injury or Fatality (RIF) estimates the potential for injury or fatality by performing a Monte Carlo simulation on 10-year historical data. In FY24 it calculated that the RIF in elevators would be 0.01 FE/mpy (Fatality Equivalent per million people per year). Since 2020 there has not been any fatalities in this sector.

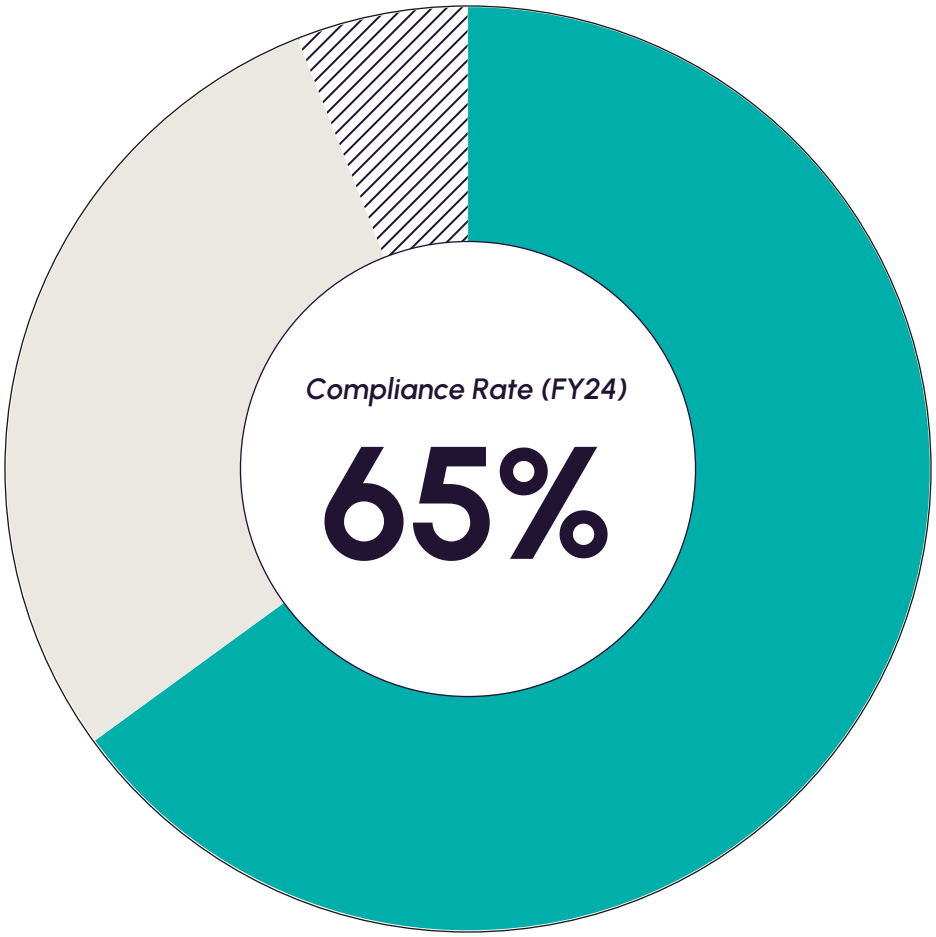
Inspection Results

TSSA conducts a variety of inspection types including periodic and non-periodic inspections every year; the below is a breakdown of the results of periodic inspections conducted in FY24.

In July 2023, TSSA introduced compliance standards for passenger elevators as a tool to identify key areas of high risk. The **pass rate for Passenger elevators** in FY 2024 was **64%.**

Figure D3: Periodic Inspection Results

- ***65%:*** *Inspections passed*
- ***29%:*** *Inspections failed*
- ***6%:*** *Other outcomes*



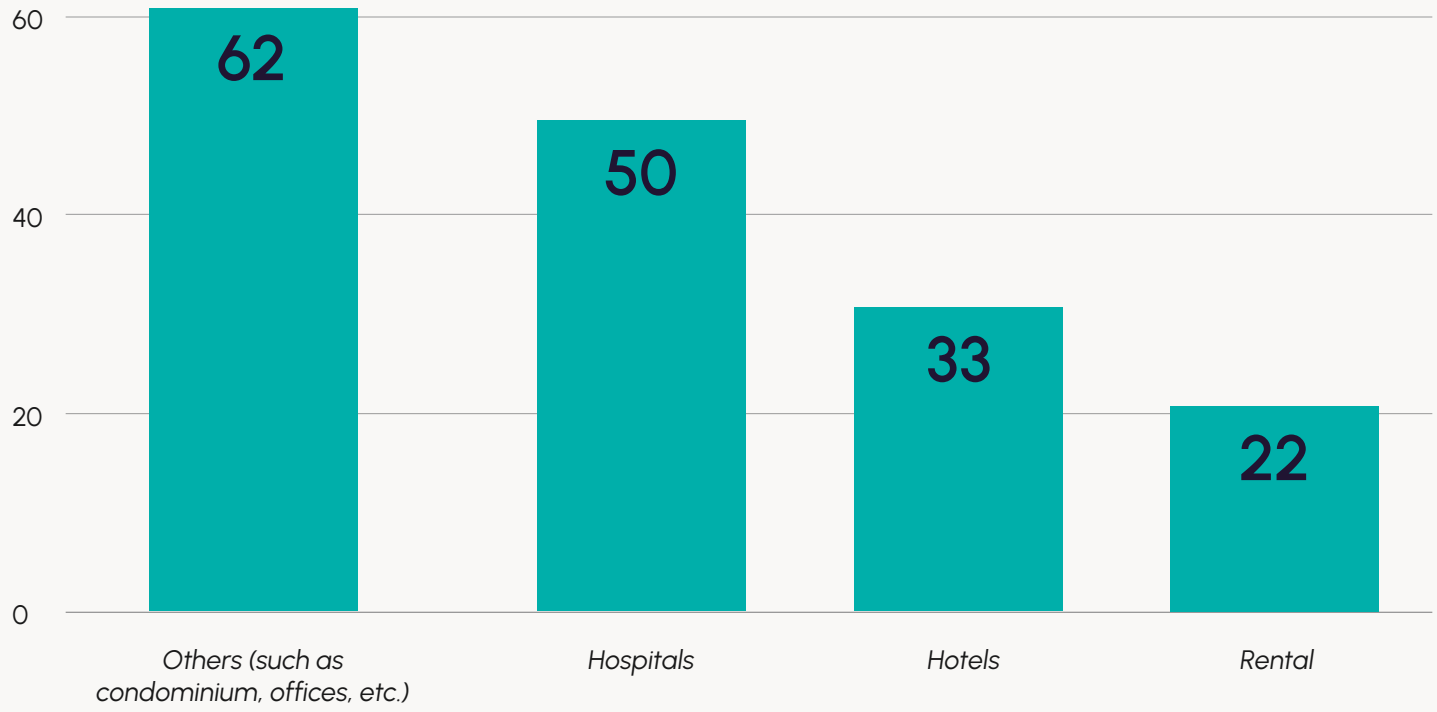
Inspections Conducted in Fiscal Year 2024

Inspection Type	*Full Compliance*	*Non-Compliances Found*	*Other*	*Grand Total*
ED Other Inspection	589	798	256	1,643
ED Alteration Inspection	1,952	428	18	2,398
ED First/Install	3,095	790	35	3,920
ED Periodic	9,094	4,157	274	13,525
Grand Total	**14,730**	**6,173**	**583**	**21,486**

Figure D4: High-risk Elevators in FY24

Number of High-risk Elevators **167**

Percentage of High-risk Inventory **0.32%**

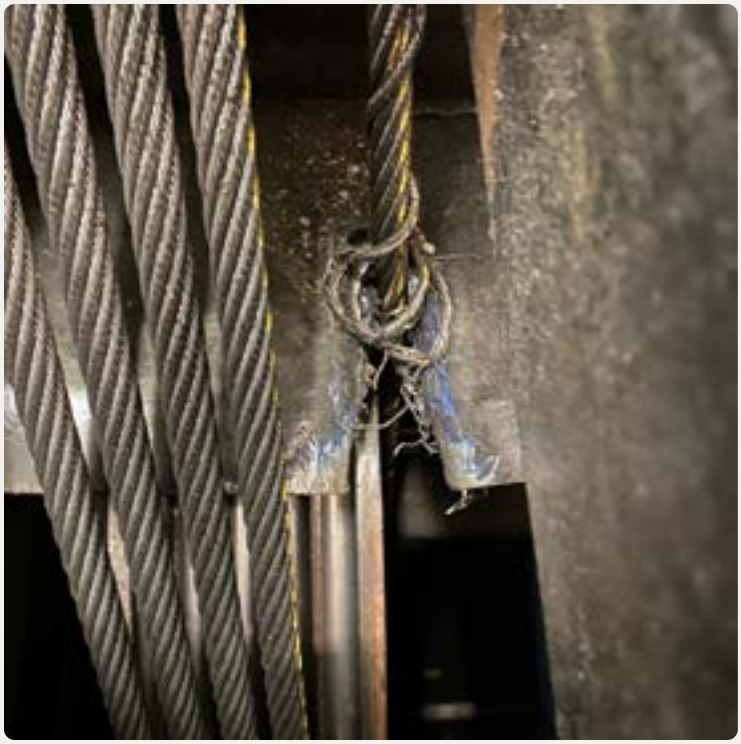


*Results are based on the 2017 RBS model

Top High-risk Issues from Periodic Inspections (2024)

Compliance Issue	*Total Number of Orders Issued*	*Percentage of Total Number of Orders Issued*
Restrict hoistway or car door opening annual periodic task not complete, and records not maintained	548	10.21%
Ensure a mechanism in place to prevent car or hall doors from opening more than 100 mm; when the car is not in the designated unlocking zone	463	8.63%
Scheduled maintenance task not complete and logbook not signed to confirm compliance.	403	7.51%

Case Study: Resident Experiences Distress After Elevator Rope Breaks



The broken elevator rope that caused the outage

The rope keeper interferes with the running clearance of the traction rope due to an issue with the keeper bracket setup

Background

In 2023, a resident was trapped in an elevator of a high-rise building in Southern Ontario. The situation escalated when one of the elevator ropes broke, leaving the resident stranded and distressed. The elevator contractor was immediately called upon to provide emergency assistance. Although appearing unharmed upon rescue and initially declining medical treatment, the resident experienced a panic attack and suffered a stroke at home the following day, resulting in a nine-day hospital admission.

TSSA Analysis and Action

Upon receiving the incident report, TSSA initiated an investigation and ordered the elevator to be locked out until deemed safe for use. TSSA's investigation discovered that the traction rope failure may have been attributed to either improper setup or that the rope keeper bracket may not have been tightened sufficiently into its designated position.

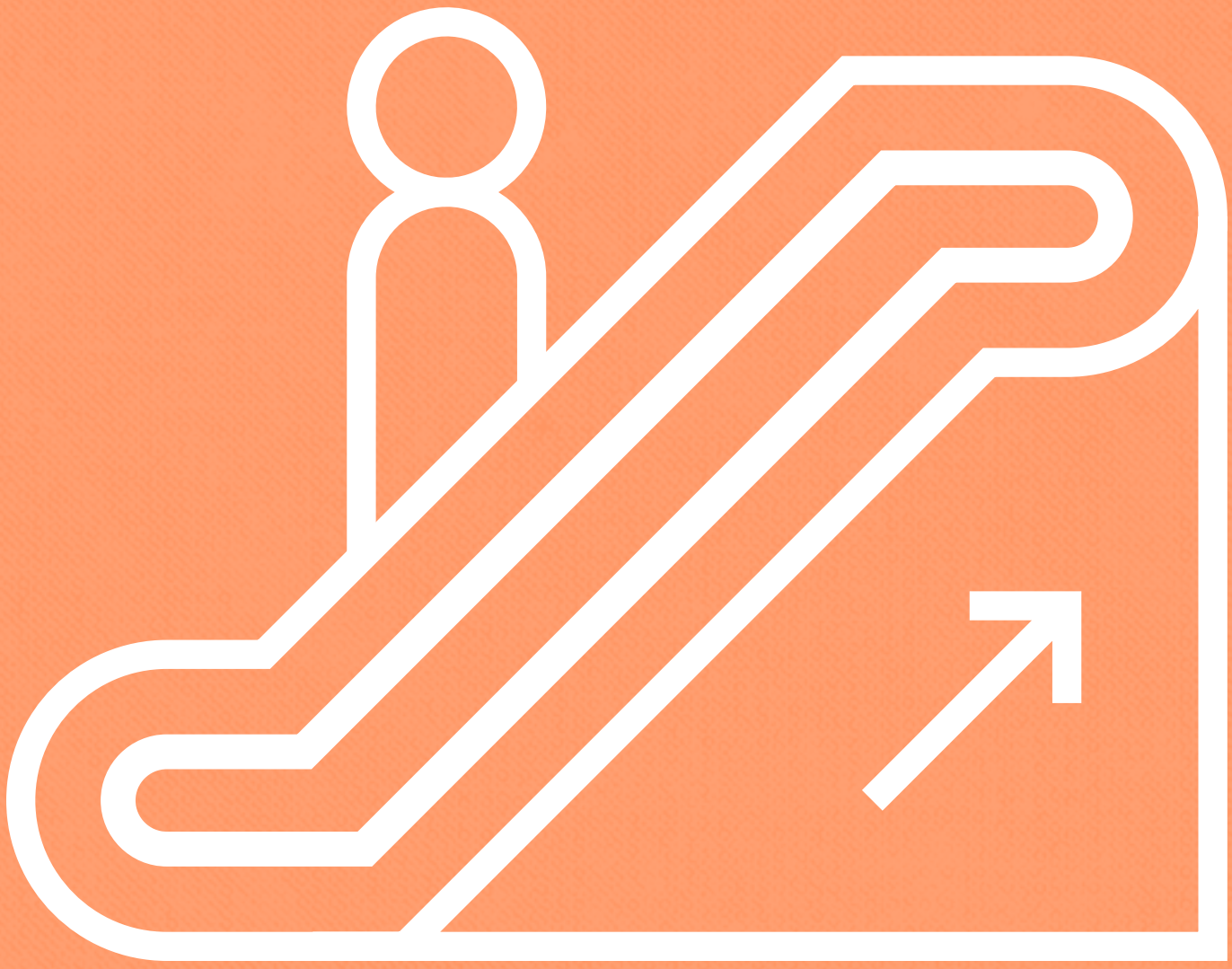
As evidenced by TSSA's data, this incident underscores the critical importance of meticulous elevator setup and maintenance protocols to avert similar occurrences in the future. According to TSSA's data, improper or inappropriate maintenance processes and practices have been identified as one of the top three causes of incidents over the past year.

In collaboration with the contractor in this case, TSSA organized comprehensive training sessions to educate mechanics on the correct setup procedures for elevator devices.

Gilbert Timmons, TSSA's inspector for this incident, said, "This incident reminds elevator owners and contractors of their responsibilities in properly maintaining their devices for safe use. It is essential that they stay refreshed and updated on the safety standards and ensure their elevators comply with these requirements. Safety is a collective responsibility of all parties involved, and this is how we can collaborate to improve elevator safety and availability for users."

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.

At a Glance

Compliance Rate FY24

Escalators and Moving Walks

42%

Number of Authorized Devices

Escalators

2,405

Approved Engineering Designs

Escalators

42

Owners

Escalators

363

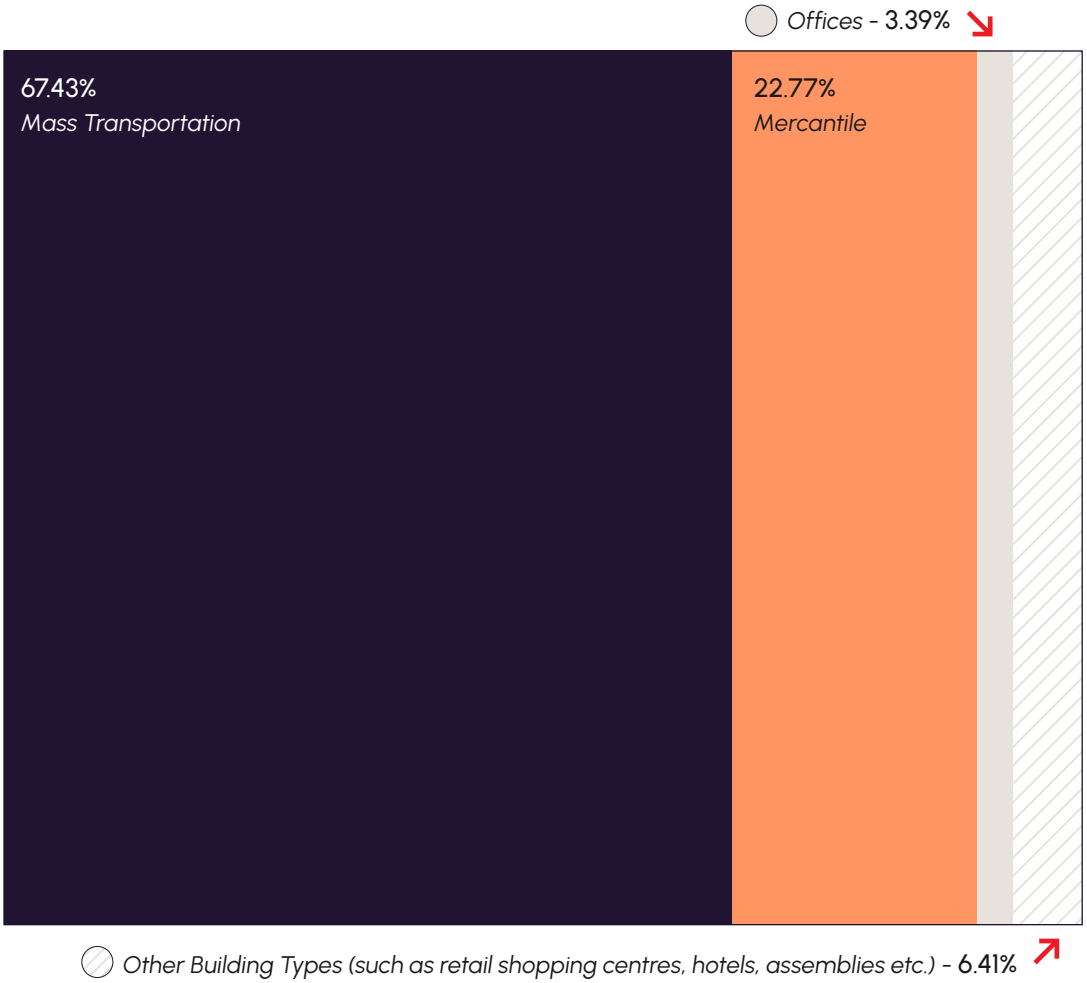
Incidents, Injuries and Fatalities

We've observed **an increase in incidents and injuries due to the growing population's heightened usage**. Additionally, we experienced a fatality this year as a result of an individual using a walker on an escalator.

Incidents

Reporting Period	*Incidents*	*Non-Permanent Injuries*	*Permanent Injuries*	*Fatalities*
10-year average	666	404	4	0
2024	854	425	8	1

Top Escalators and Moving Walks Building Types by Number of Incidents (2015-2024)



Incidents per 100 Escalators in Ontario in FY24

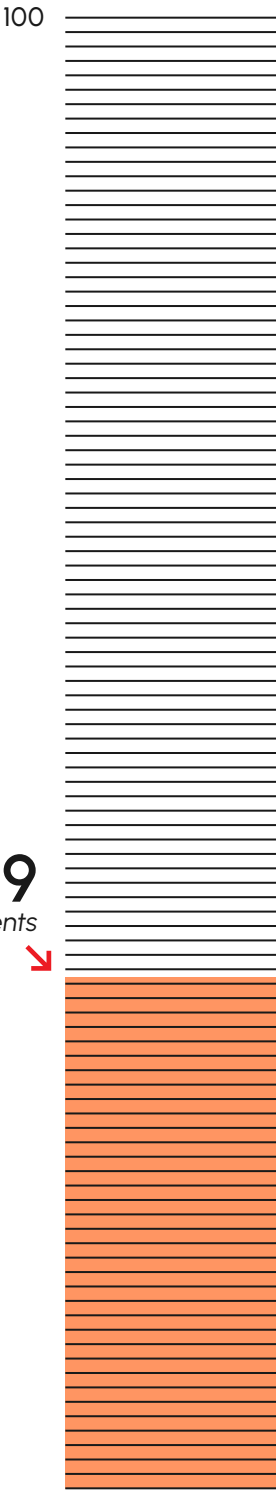
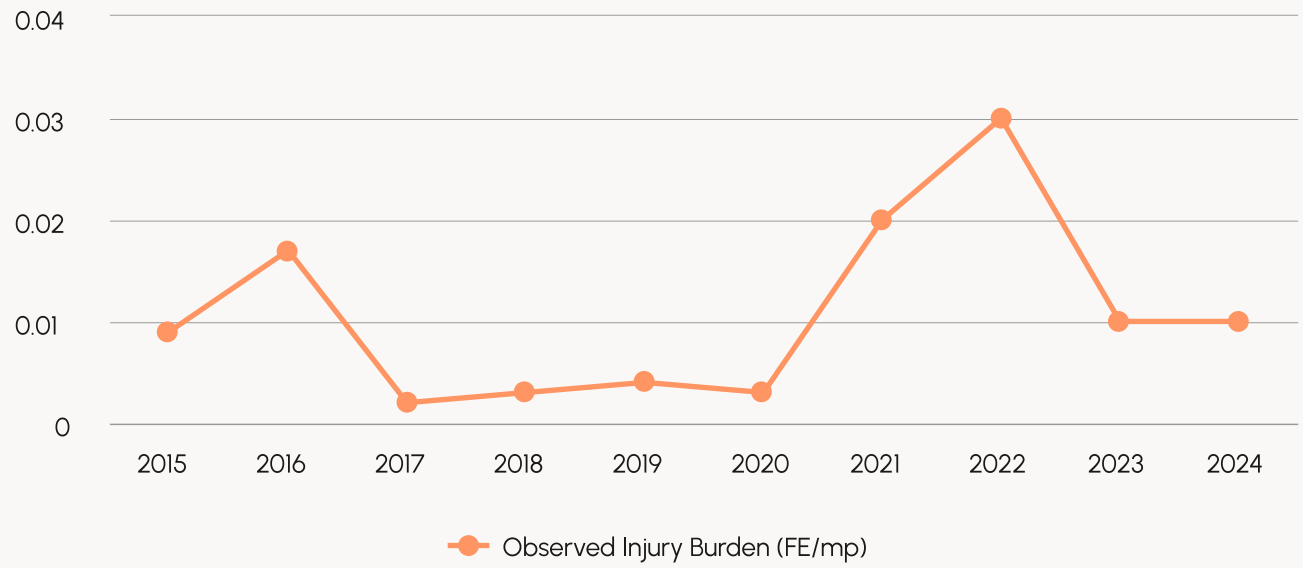
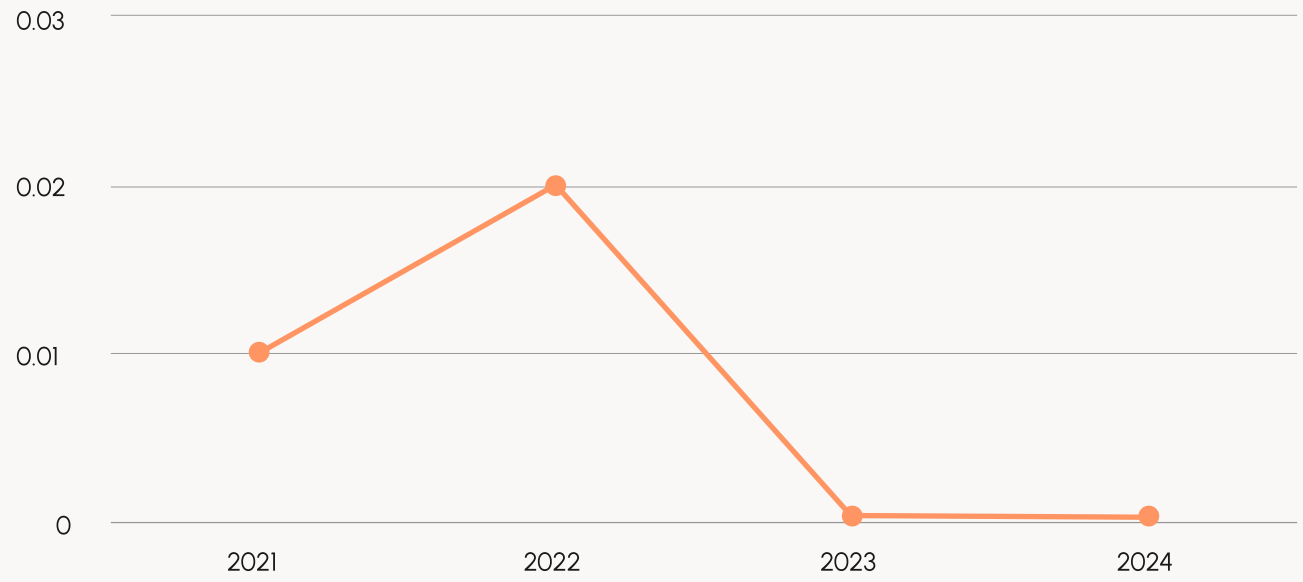


Figure E1: 10-Year Observed Injury Burden Trend for Escalators and Moving Walks in Ontario



Non-permanent and permanent injuries have fluctuated while we have seen one fatality this year and last. As a result the OIB for the past 3 years have been increasing.

Figure E2: Risk of Injury or Fatality for Escalators and Moving Walks (2021-2024)



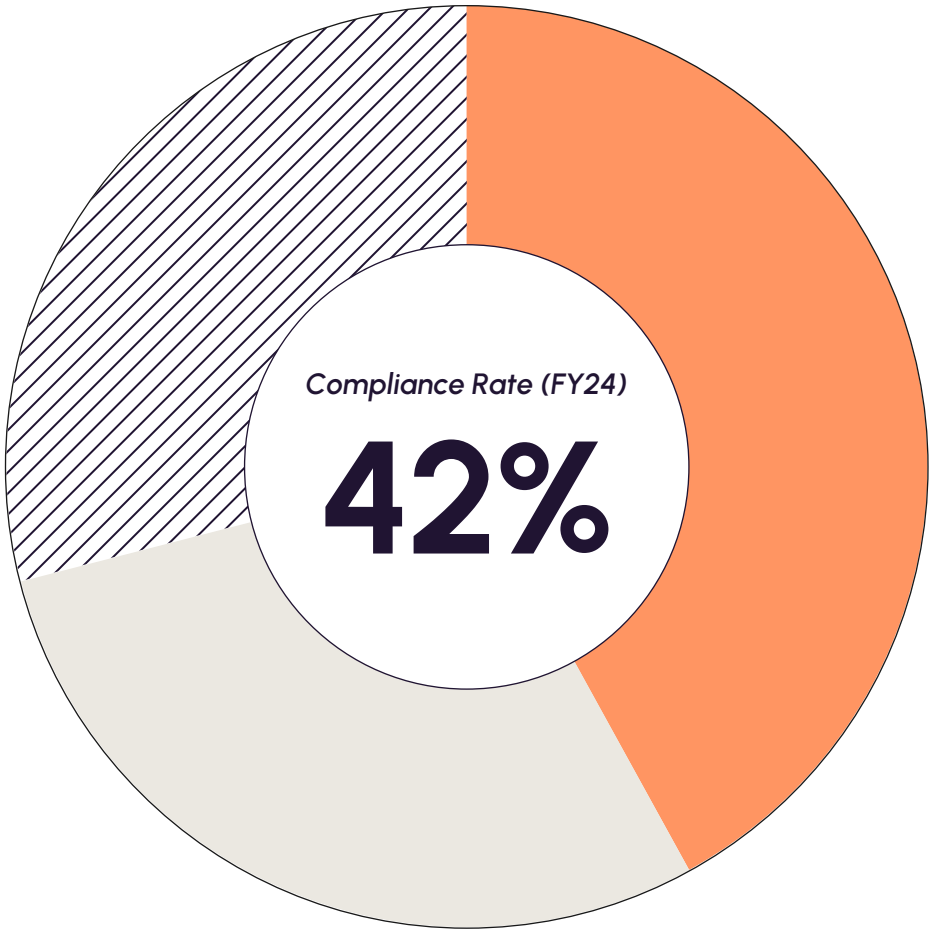
TSSA's Risk of Injury or Fatality (RIF) estimates the potential for injury or fatality by performing a Monte Carlo simulation on 10-year historical data. In FY24 it calculated that the RIF in escalators would be 0.0001 FE/mpy (Fatality Equivalent per million people per year).

Inspection Results

TSSA conducts a variety of inspection types including periodic and non-periodic inspections every year; the below is a breakdown of the results of periodic inspections conducted in FY24.

Figure E3: Periodic Inspection Results

- ***42%:*** *Inspections passed*
- ***29%:*** *Inspections failed*
- ***29%:*** *Other outcomes*

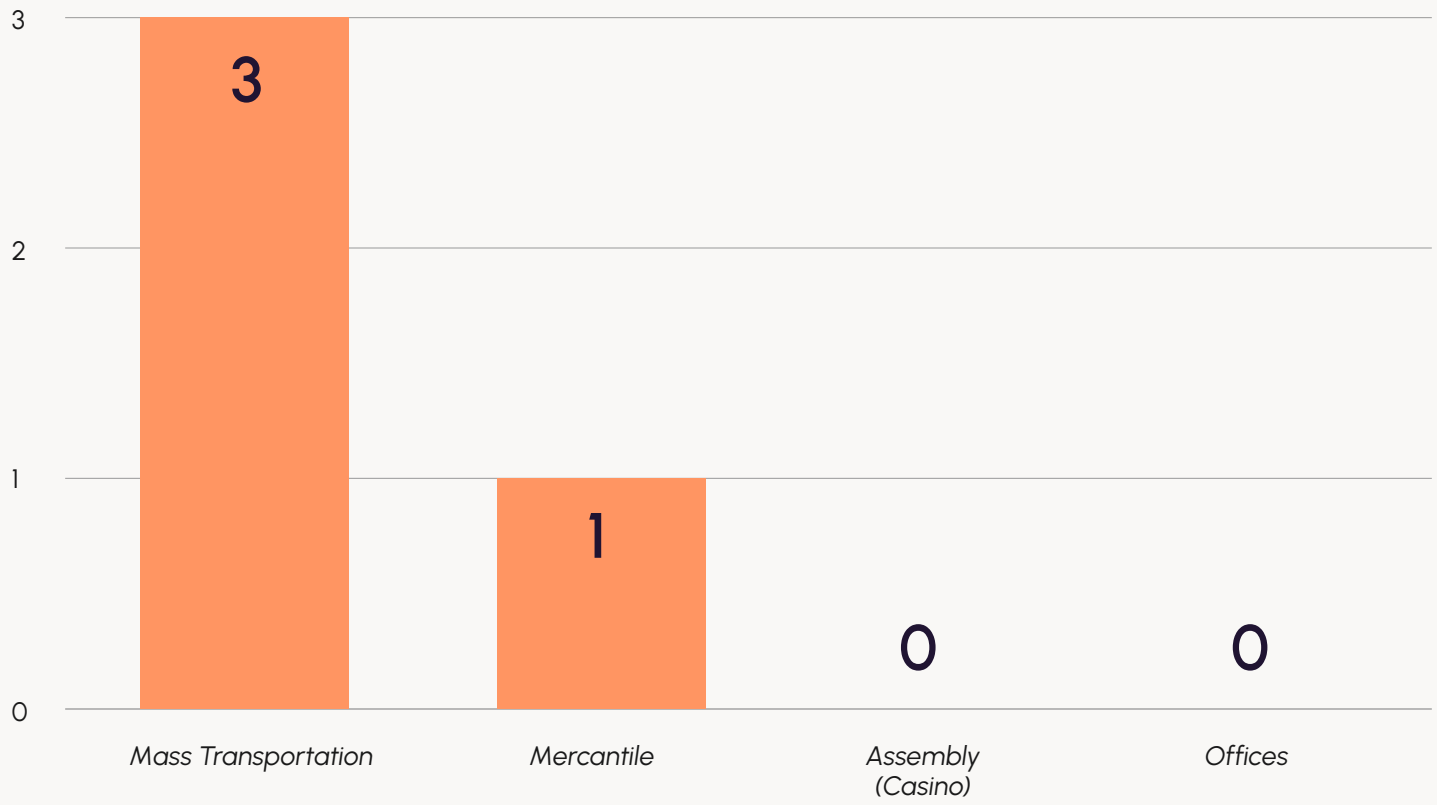


Inspections Conducted in Fiscal Year 2024

Inspection Type	*Full Compliance*	*Non-Compliances Found*	*Other*	*Grand Total*
ED Alteration Inspection	25	6	2	33
ED Other Inspection	35	53	15	103
ED First/Install	176	37	0	213
ED Periodic	344	201	5	550
Grand Total	**580**	**297**	**22**	**899**

Figure E4: High-risk Escalators and Moving Walks in FY24

Number of High-risk Escalators	**4**	*Percentage of High-risk Inventory*	**0.24%**



Top High-risk Issues from Periodic Inspections (2024)

Compliance Issue	*Total Number of Orders Issued*	*Percentage of Total Number of Orders Issued*
The step demarcation lights are inoperative	21	5.97%
No record of the annual periodic task for the escalator	19	5.40%
Repair/replace the steps with broken tread	17	4.83%

Case Study: Patron's Loss of Balance Triggers Multiple Falls on Escalator

Stock image of woman using an escalator

Background

In a bustling transportation facility in Southern Ontario during the fall season, a female commuter lost her balance on an ascending escalator, causing multiple injuries. As she fell backward, she hit an elderly woman and a man, resulting in knee injuries for both women and a head laceration for the man. Medical assistance was offered at the scene, and two individuals were sent to the hospital for further treatment.

TSSA Analysis and Actions

Upon investigation, TSSA found there were no mechanical errors with the escalator and that the possible cause of the incident was passengers failing to follow safety instructions. Two of the people who were injured, a male commuter with a buggy-style carrier and a female using a cane for walking assistance, should have opted to take the elevator available on the premises instead of the escalator, as indicated by the safety signage.

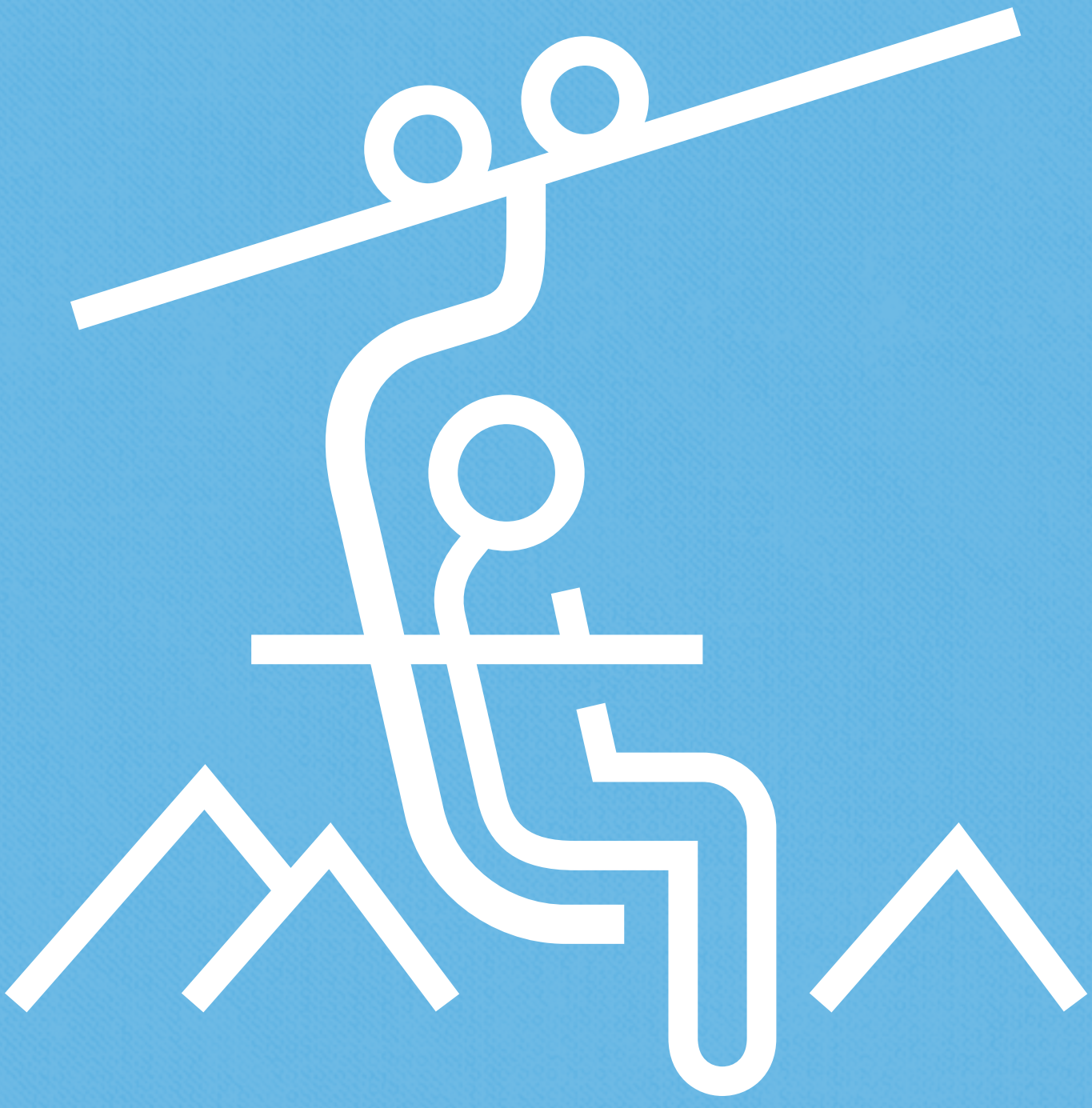
The transportation company has been actively modernizing its stations by implementing improved accessibility aids and installing elevators connecting the street to the platforms. The on-premise elevator has been in operation since 2018.

This fiscal year, TSSA reported a 26% year-on-year increase in escalator incidents. There was also a rise in injuries, with non-permanent injuries increasing by 13%. Failure to follow safety instructions accounted for 67% of the causes of incidents involving escalators in the past 10 years.

TSSA highlights this incident as a reminder to commuters about the importance of following safety instructions when using escalators. Cy Gray, TSSA's Manager, Investigations, who led the investigation of this incident, stated, "The riding public needs to recognize the risks associated with escalators when safety instructions are not closely followed. Additionally, proactive measures can be taken by the transportation company to enhance safety and awareness. For example, implementing more signage at the premises and providing additional education on the availability of elevators as alternatives to escalators would be beneficial."

Elevating Devices:

Passenger Ropeways and Ski Lifts



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

At a Glance

Compliance Rate FY24

Ski lifts

79%

Number of Authorized Devices

Ski lifts

223

Approved Engineering Designs

Ski lifts

4

Registered Contractors

Ski lifts

45

Owners

Ski lifts

63

Certified Mechanics

Ski lifts

304

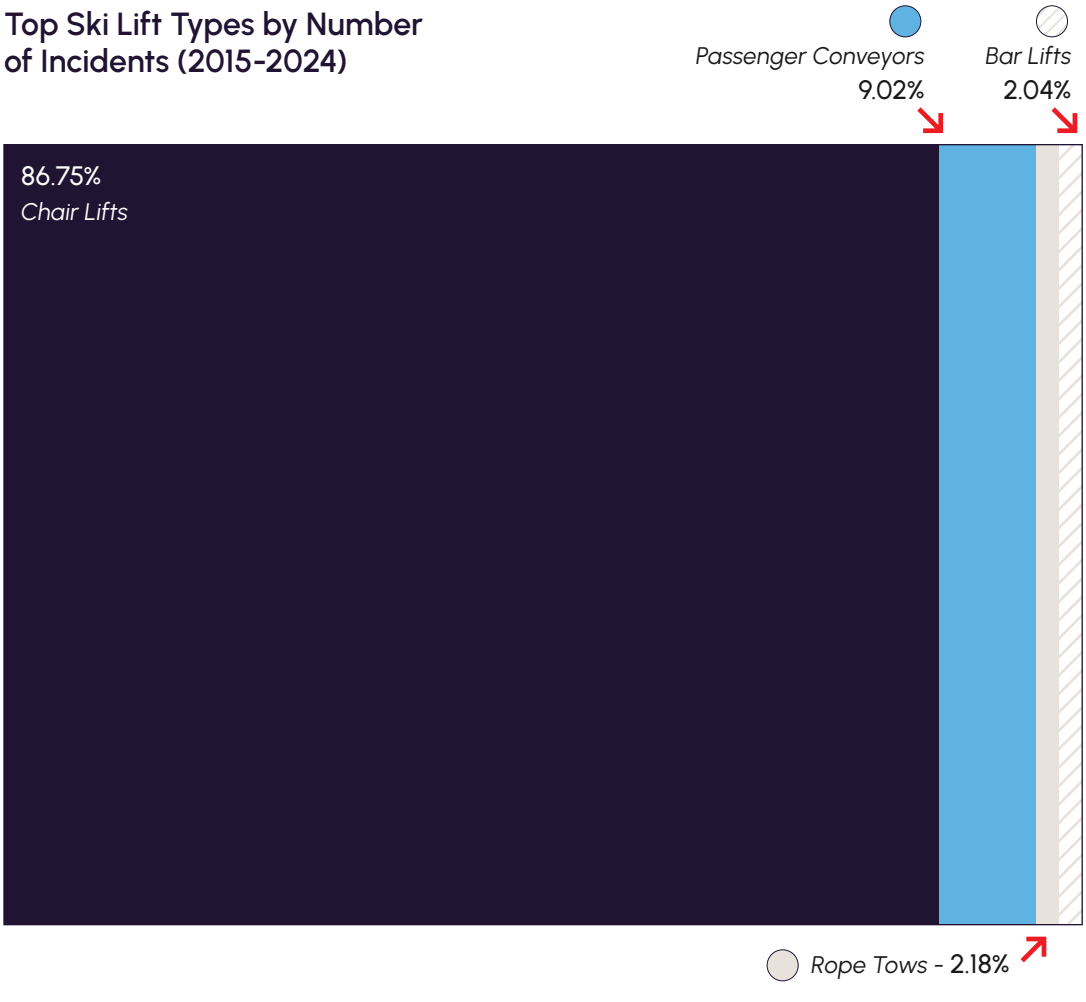
Incidents, Injuries and Fatalities

The **total number of incidents has decreased this year in the ski industry**. Through TSSA's Advisory Councils, TSSA is aware that the many ski resorts saw lower than usual attendance this past season.

Incidents

Reporting Period	*Incidents*	*Non-Permanent Injuries*	*Permanent Injuries*	*Fatalities*
10-year average	69	52	3	0
2024	53	43	5	0

Top Ski Lift Types by Number of Incidents (2015-2024)



Incidents per 100 Ski Lifts in Ontario in FY24

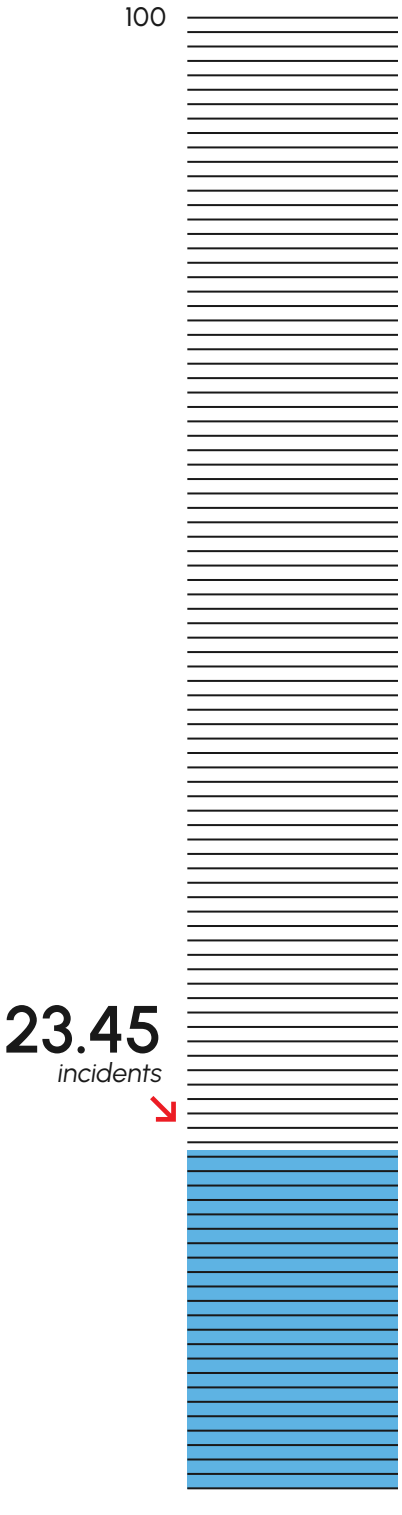
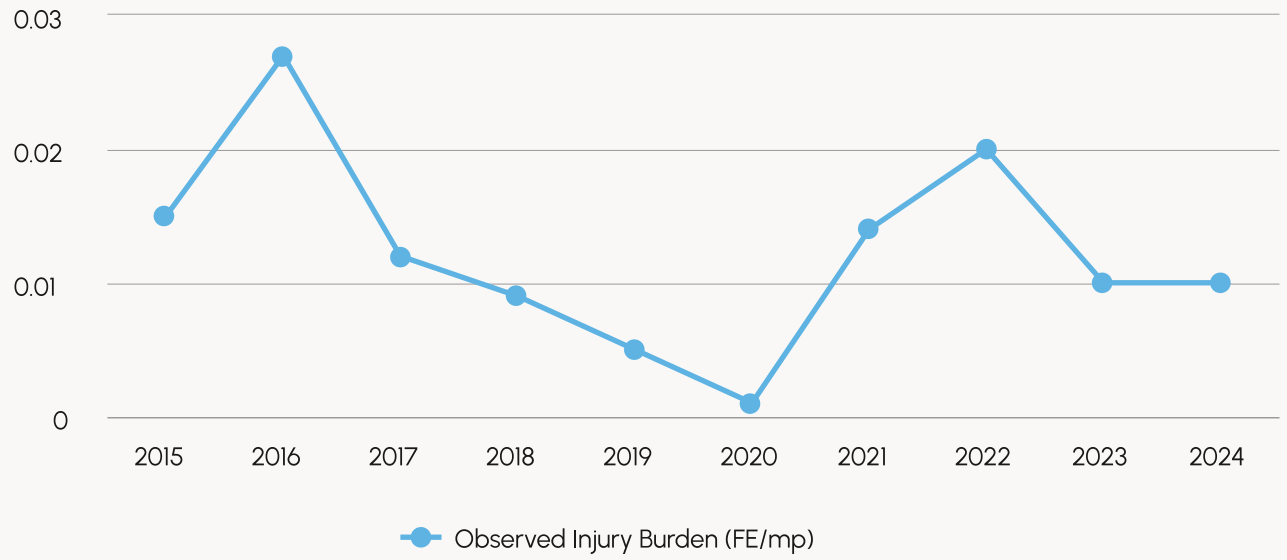
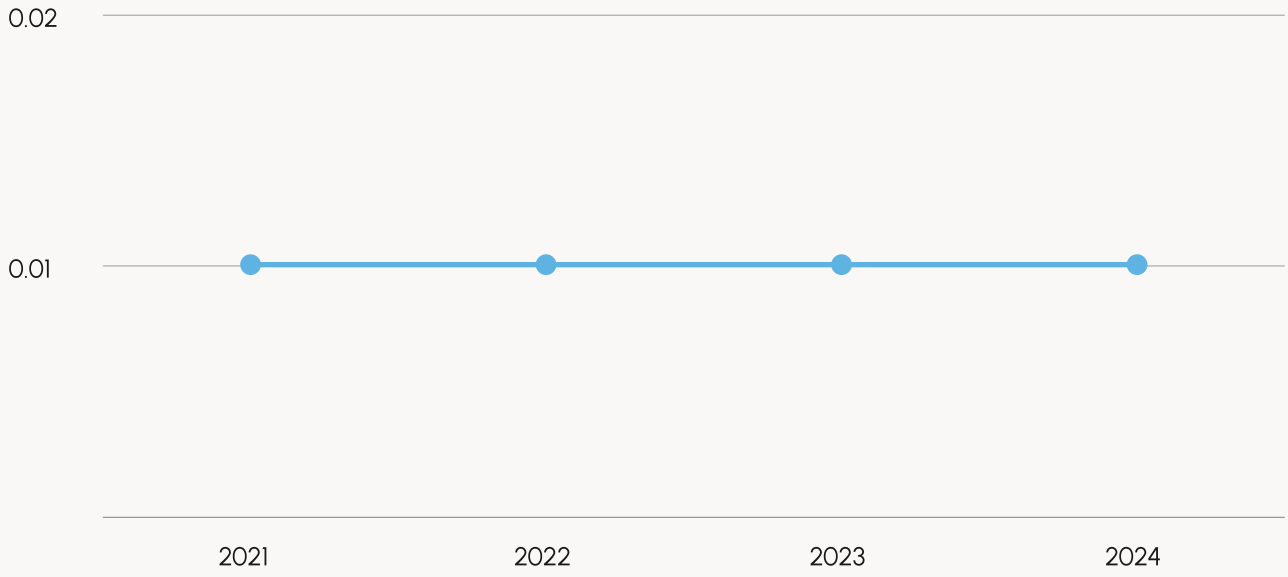


Figure F1: 10-Year Observed Injury Burden Trend for Ski Lifts in Ontario



Trend analysis suggests that while there have been fluctuations overall the injury burden has been improving. This could be due to various factors such as improved safety protocols, better training or advancement in protective equipment.

Figure F2: Risk of Injury or Fatality for Ski Lifts (2021-2024)



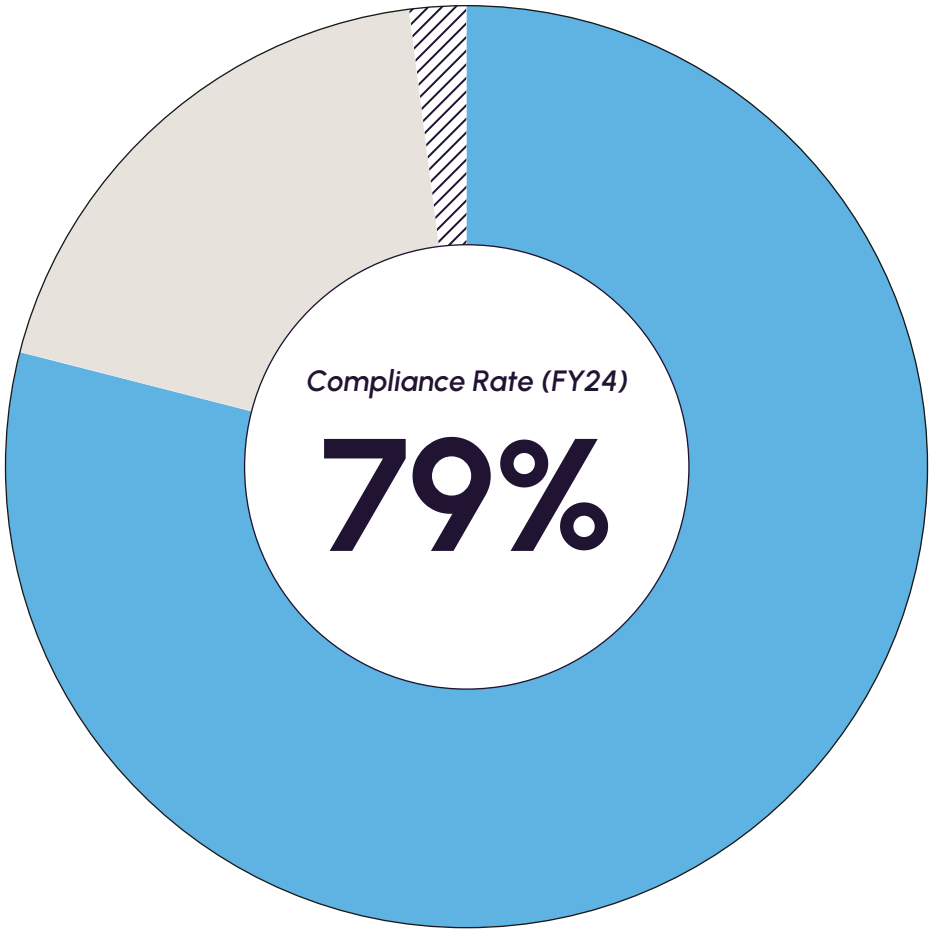
TSSA's Risk of Injury or Fatality (RIF) estimates the potential for injury or fatality by performing a Monte Carlo simulation on 10-year historical data. In FY24 it calculated that the RIF in ski lifts would be 0.01 FE/mpy (Fatality Equivalent per million people per year).

Inspection Results

TSSA conducts a variety of inspection types including periodic and non-periodic inspections every year. Below is a breakdown of the results of periodic inspections conducted in FY24.

Figure F3: Periodic Inspection Results

- ***79%:*** *Inspections passed*
- ***19%:*** *Inspections failed*
- ***2%:*** *Other outcomes*

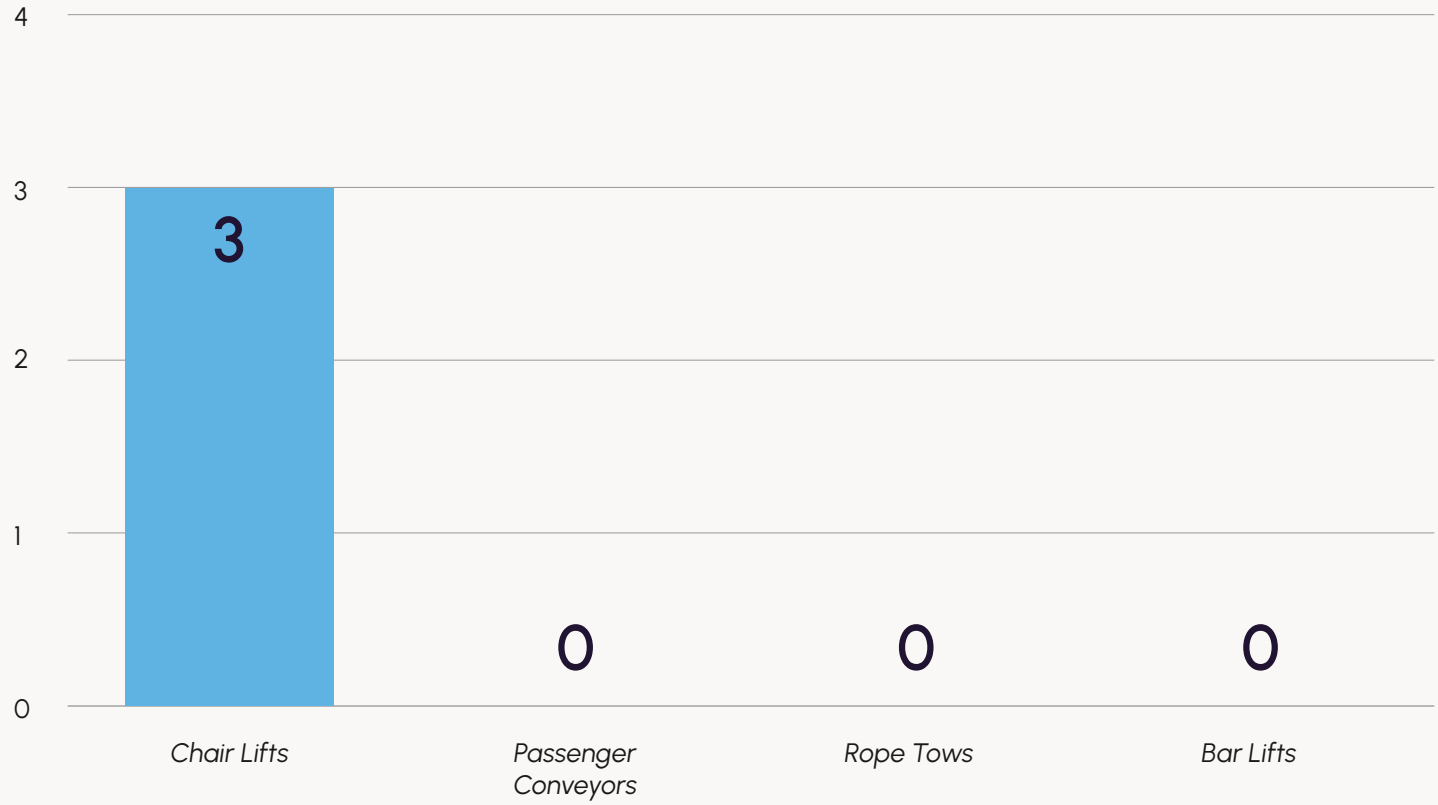


Inspections Conducted in Fiscal Year 2024

Inspection Type	*Full Compliance*	*Non-Compliances Found*	*Grand Total*
SKI First/Install	7	0	7
SKI Other Inspection	15	7	22
SKI Alteration Inspection	41	3	44
SKI Periodic	137	21	158
Grand Total	**200**	**31**	**231**

Figure F4: High-risk Ski Lifts in FY24

Number of High-risk Ski Lifts	3	*Percentage of High-risk Inventory*	1.27%



Top High-risk Issues from Periodic Inspections (2024)

Compliance Issue	*Total Number of Orders Issued*	*Percentage of Total Number of Orders Issued*
Over hanging tree limbs not removed	6	8.33%
Service brakes not adjusted to provide the correct braking force	4	5.56%
Stop button inoperative	3	4.17%

Case Study: A Young Skier Falls From Chair Lift

↗ *Stock image of the loading area of a ski lift*

Background

A young skier taking part in ski race training at an Ontario resort was going up a ski hill with her coach on a chair lift. She was not properly loaded onto the chair in the first place and lost her balance. Her coach tried to help by hanging on to her as the chair continued up the hill.

The operator was not initially aware that the child was not properly loaded. With the lift moving farther upward, the child eventually fell from a height of 24 feet. Some skiers noticed what was happening and were able to help slow her fall and soften the impact. The snow was deep that day where she fell on to the hill, further cushioning the blow.

The young skier received immediate care from ski patrol and was taken to the hospital, where she was not diagnosed with any major injuries. The chair lift was shut down for the day, and the incident was reported to TSSA.

TSSA Analysis and Action

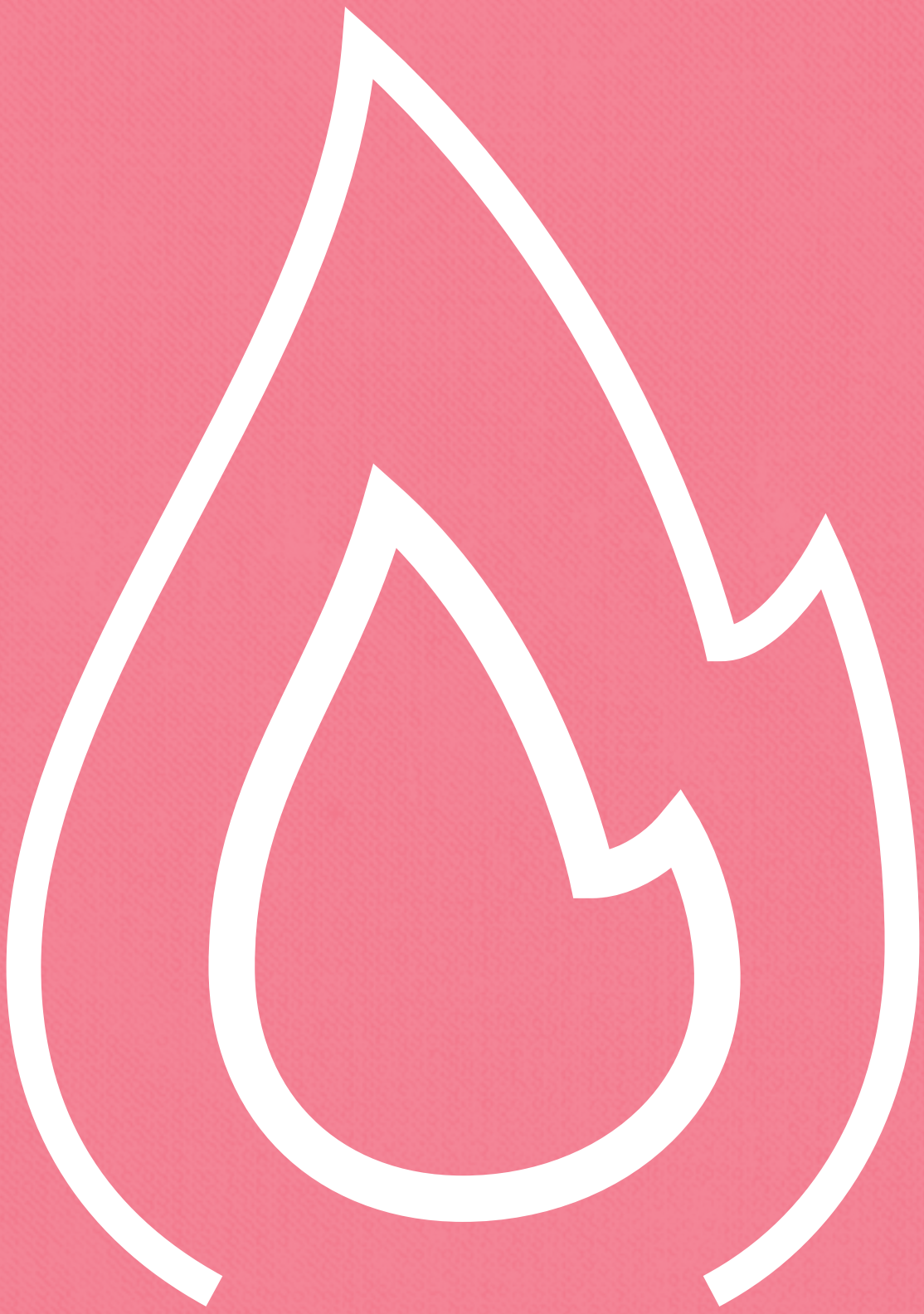
Following an investigation, TSSA found that the child had not been loaded on the chair lift in the right way as it departed the loading area. The operator is responsible for ensuring skiers are properly loaded onto the chair and to stop the lift they are not. Additionally, the program instructor was unclear how to handle such emergencies. According to the race training instruction, coaches should not hang on to falling participants in case of a missload and should let them fall early when the chair is close to the ground or where the skier may be caught by a net or padding.

TSSA issued orders requiring an enhancement of operator training to ensure frontline staff are more proficient in safety protocols and risk awareness. Since the incident, the resort has conducted comprehensive staff retraining, reviewed loading procedures, strengthened briefings for race program staff, and increased operational supervision.

"This incident could have caused significant harm to the young chair lift user," said Bill Kirk, TSSA's inspector who investigated the incident. "To prevent such incidents from happening, ski lift operators must revisit and review safety procedures regularly and prioritize staff training. Attendants should remain vigilant at all times so they can immediately respond to emergencies."

Chair lifts are the largest number of lift devices in Ontario. According to TSSA's data around ski lifts, the majority of incidents occurred on chair lifts, making up 87% of the total in the past 10 years. TSSA continues to actively collaborate with the ski industry to enhance safety. One of these efforts was the introduction of compliance standards for ski lifts and passenger ropeways in 2023 to help the community identify the highest safety risks and focus on necessary remedial actions. The compliance rate of inspected devices reached 79% in the past fiscal year.

Fuels



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.

At a Glance

Compliance Rate FY24

Fuels

Liquid Fuels
55%

Propane
76%

Petroleum Contractors
94%

Heating Contractors
90%

Design Reviews

Fuels

1,459

Registered Contractors

Fuels

8,917

Certificate Holders

Fuels

60,126

Accredited Training Providers

Fuels

131

Heating and Petroleum Contractor Audits

Fuels

2,010

Incidents, Injuries and Fatalities

The **total number of incidents decreased in 2024 compared to the 10-year average**, there was a slight increase in non-permanent injuries and a significant decrease in the number of permanent injuries. The **number of fuel related incidents** (excluding pipeline strikes) per **million people has decreased from 81 in 2015 to 59 in 2024** – a measurable improvement.

Incidents

Reporting Period	*Incidents*	*Non-Permanent Injuries*	*Permanent Injuries*	*Fatalities*
10-year average	3,211	31	12	2
2024	3,173	32	5	3

Incidents Currently Under Review*

Reporting Period	*Incidents*	*Non-Permanent Injuries*	*Permanent Injuries*	*Fatalities*
2024	339	1	0	0
2023	19	1	3	0

*Open incidents as of 2024-05-01

Breakdown of Fuels Incident Types 2024

Incident Type	*Incidents*	*Non-Permanent Injuries*	*Permanent Injuries*	*Fatalities*
Pipeline Strikes	2,224	0	0	0
Non-Pipeline Strikes	949	32	5	3

Non-Pipeline Strikes Incidents per 100 Fuel Facilities and Sites in Ontario in FY24

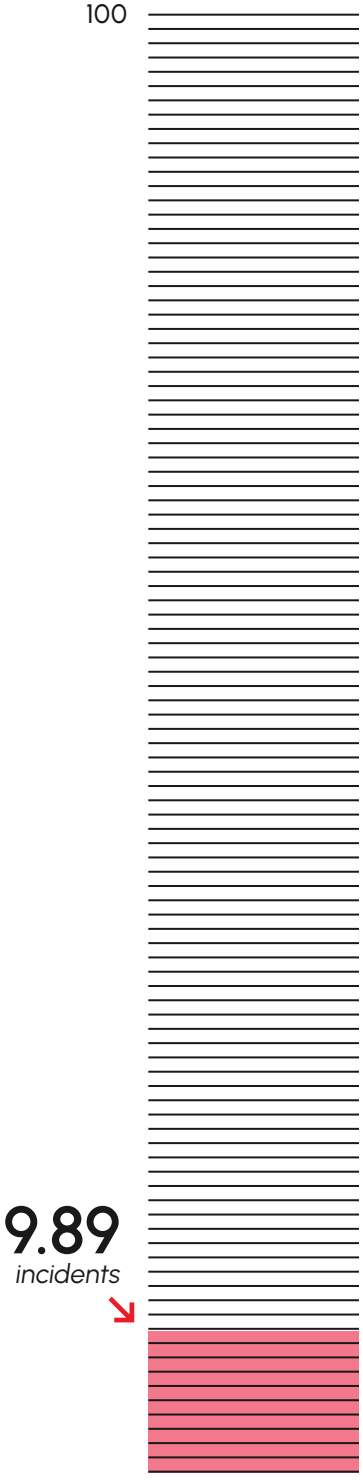
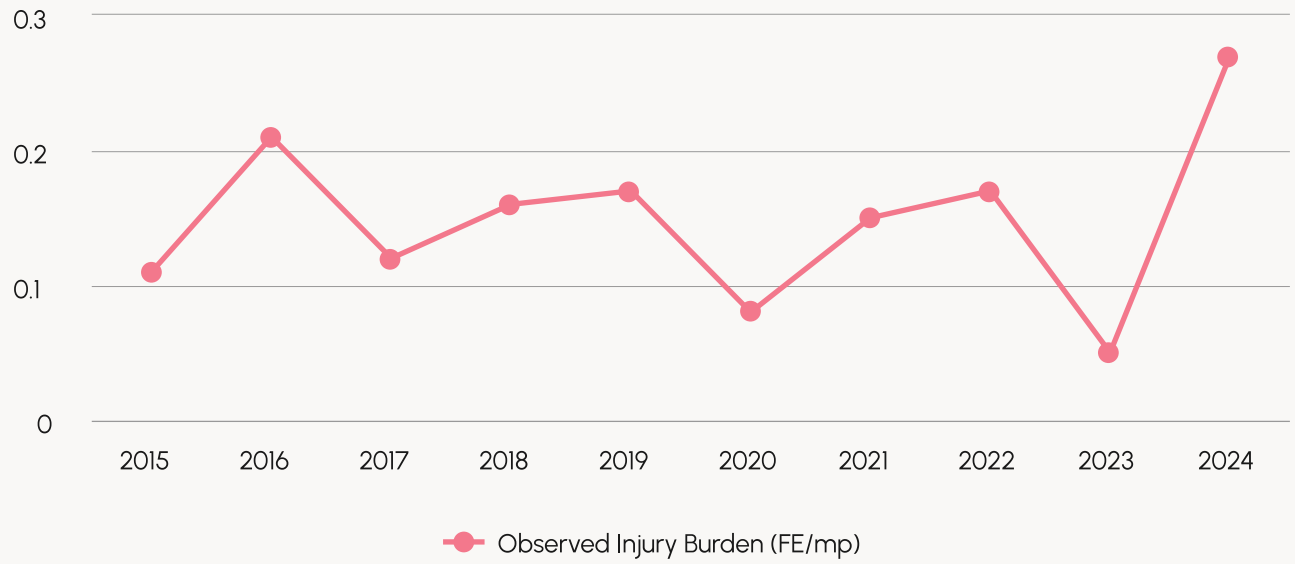
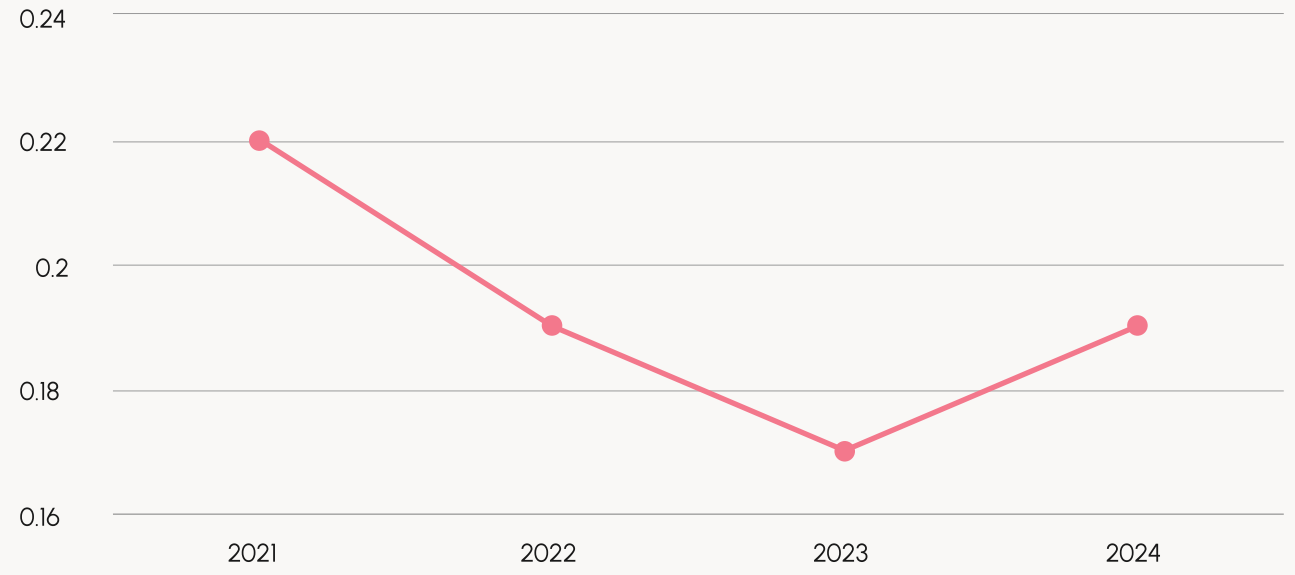


Figure G1: 10-Year Observed Injury Burden Trend for Fuels in Ontario



The observed injury burden has fluctuated in the past 10 years, with the highest peak occurring in 2022 due to the highest number of fatalities recorded. However, we have seen a 58% decrease in permanent injuries this year compared to the 10-year average.

Figure G2: Risk of Injury or Fatality for Fuels (2021-2024)



TSSA's Risk of Injury or Fatality (RIF) estimates the potential for injury or fatality by performing a Monte Carlo simulation on 10-year historical data. In FY24 it calculated that the RIF in fuels would be 0.19 FE/mpy (Fatality Equivalent per million people per year). An increase of 0.02 FE/mpy due to 3 fatalities and non-permanent injuries reported this year while the permanent injuries have decreased.

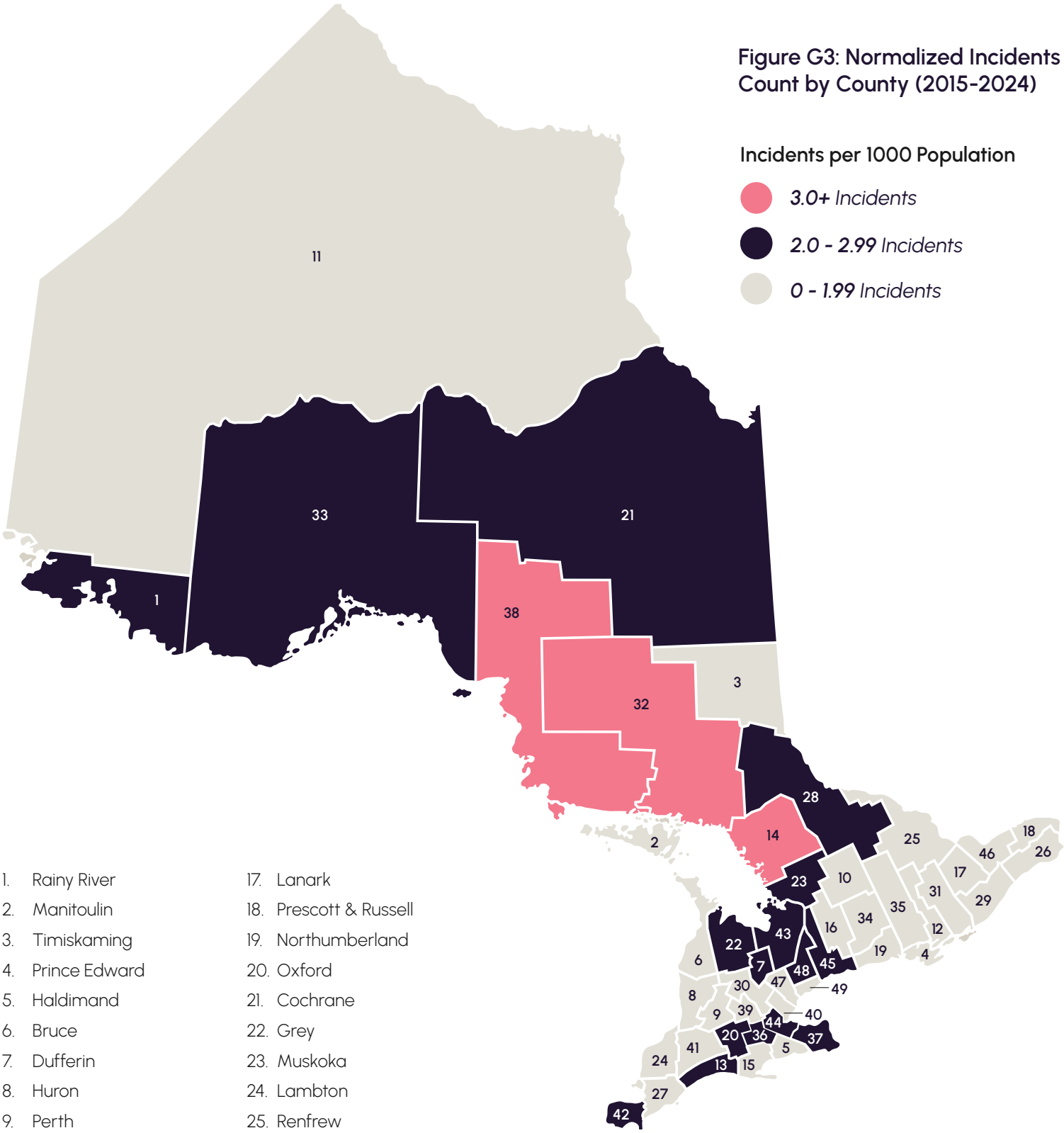
Top 3 counties with the *highest* number of fuels incidents by population (normalized); 2015-2024

County	*Number of Incidents*	*Population*	*Incidents per 1000 people*
Parry Sound	316	47,325	6.68
Sudbury	657	181,184	3.63
Algoma	409	124,991	3.27

Top 3 counties with the *least* number of fuels incidents by population (normalized); 2015-2024

County	*Number of Incidents*	*Population*	*Incidents per 1000 people*
Kenora	86	71,437	1.20
Manitoulin	8	14,678	0.55
Nipissing	44	95,407	0.46

Figure G3: Normalized Incidents Count by County (2015-2024)



1. Rainy River
2. Manitoulin
3. Timiskaming
4. Prince Edward
5. Haldimand
6. Bruce
7. Dufferin
8. Huron
9. Perth
10. Haliburton
11. Kenora
12. Lennox & Addington
13. Elgin
14. Parry Sound
15. Norfolk
16. Kawartha Lakes
17. Lanark
18. Prescott & Russell
19. Northumberland
20. Oxford
21. Cochrane
22. Grey
23. Muskoka
24. Lambton
25. Renfrew
26. Stormont, Dundas & Glengarry
27. Chatham-Kent
28. Nipissing
29. Leeds & Grenville
30. Wellington
31. Frontenac
32. Sudbury
33. Thunder Bay
34. Peterborough
35. Hastings
36. Brant
37. Niagara
38. Algoma
39. Waterloo
40. Halton
41. Middlesex
42. Essex
43. Simcoe
44. Hamilton
45. Durham
46. Ottawa
47. Peel
48. York
49. Toronto

Inspection Results

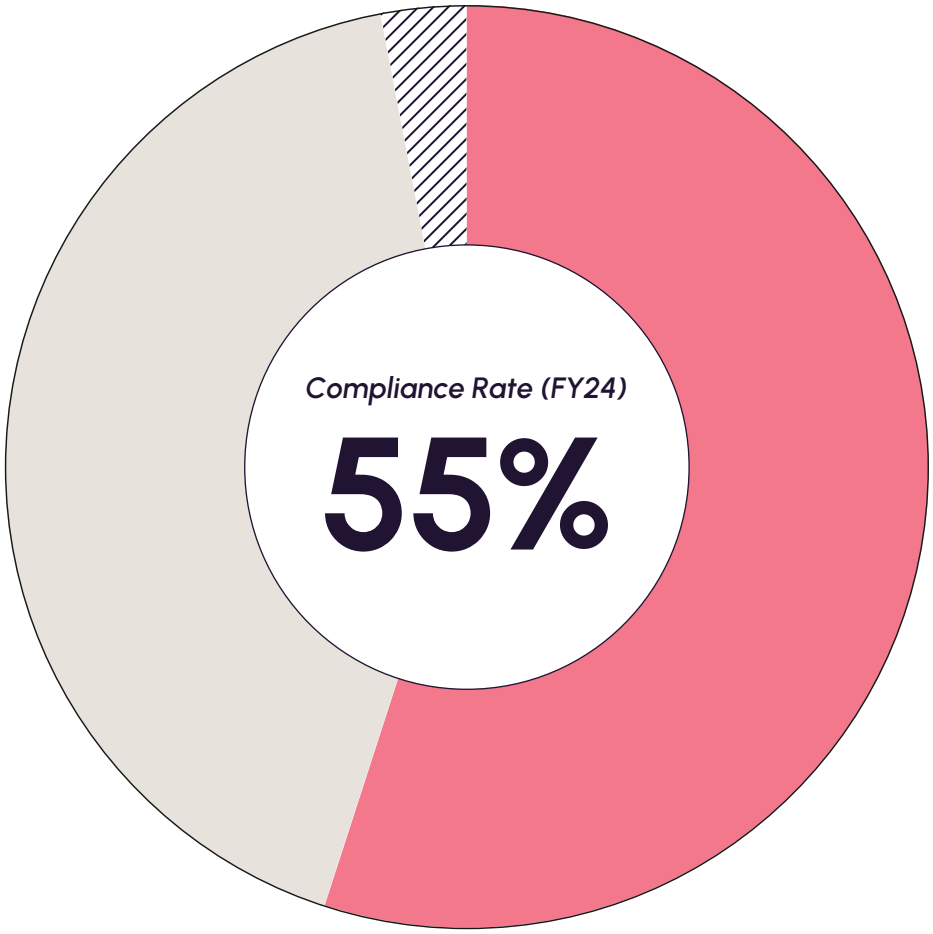
TSSA conducts a variety of inspection types including periodic and non-periodic inspections every year; the below is a breakdown of the results of periodic inspections conducted in FY24.

Liquid Fuels

TSSA conducts periodic inspections of liquid fuel storage and dispensing facilities at least once every three years to oversee and manage the state of compliance across all licensed sites in Ontario.

Figure G4: Periodic Inspection Results

- ***55%:*** *Inspections passed*
- ***42%:*** *Inspections failed*
- ***3%:*** *Other outcomes*



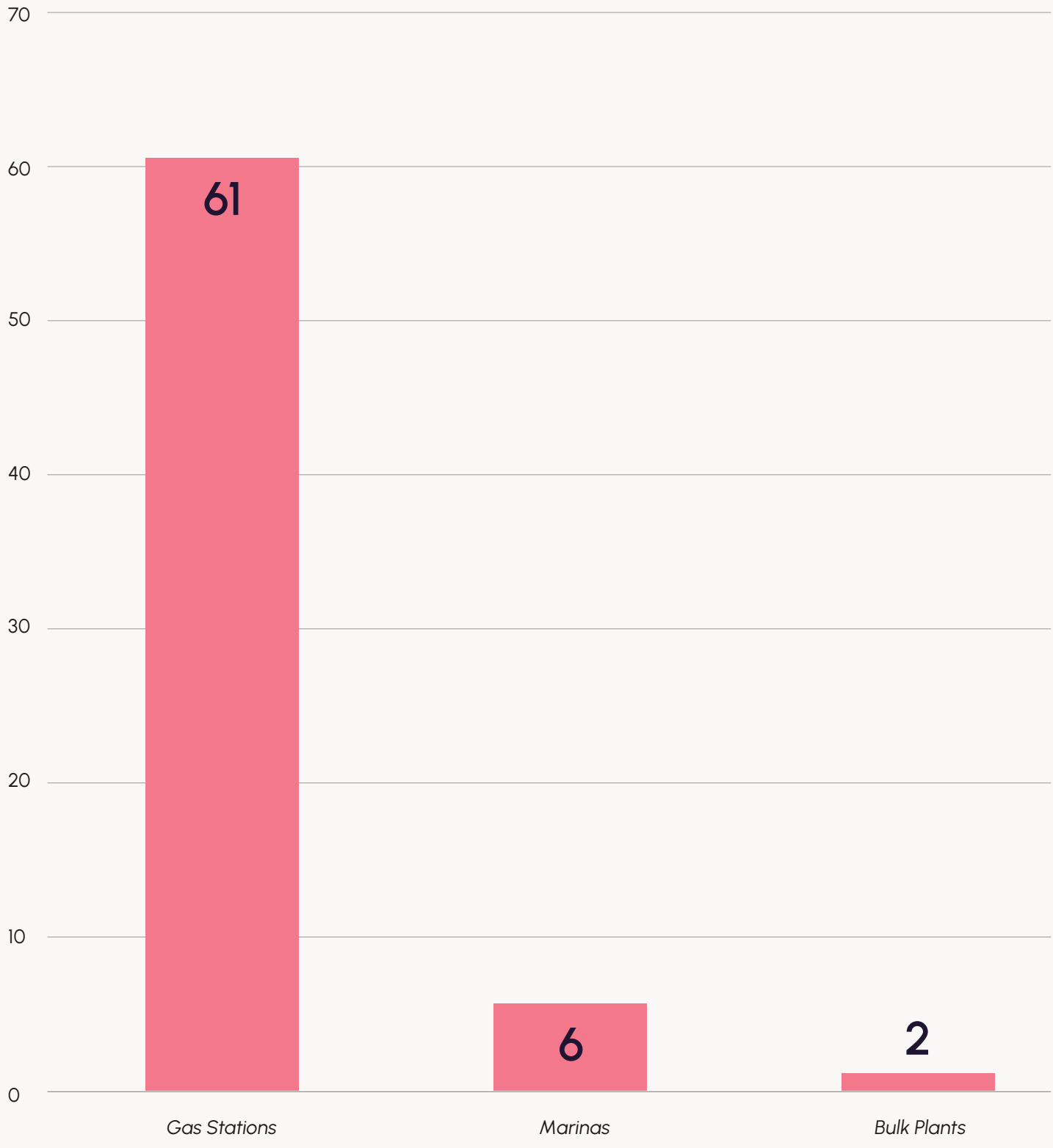
Top High-risk Issues from Periodic Inspections (2024)

Compliance Issue	*Total Number of Orders Issued*	*Percentage of Total Number of Orders Issued*
Training records of employees with equipment use, spill response and emergency response are not kept for the duration of their employment period	289	31.55%
Fire extinguishers not maintained in accordance with the Ontario Fire Code	123	13.43%
"No Smoking" and "Turn Ignition Off" signage missing	76	8.30%

Figure G5: High-risk Licensed Liquid Fuels Sites in FY24

Number of High-risk Liquid Fuel Sites **69**

Percentage of High-risk Inventory **1.84%**

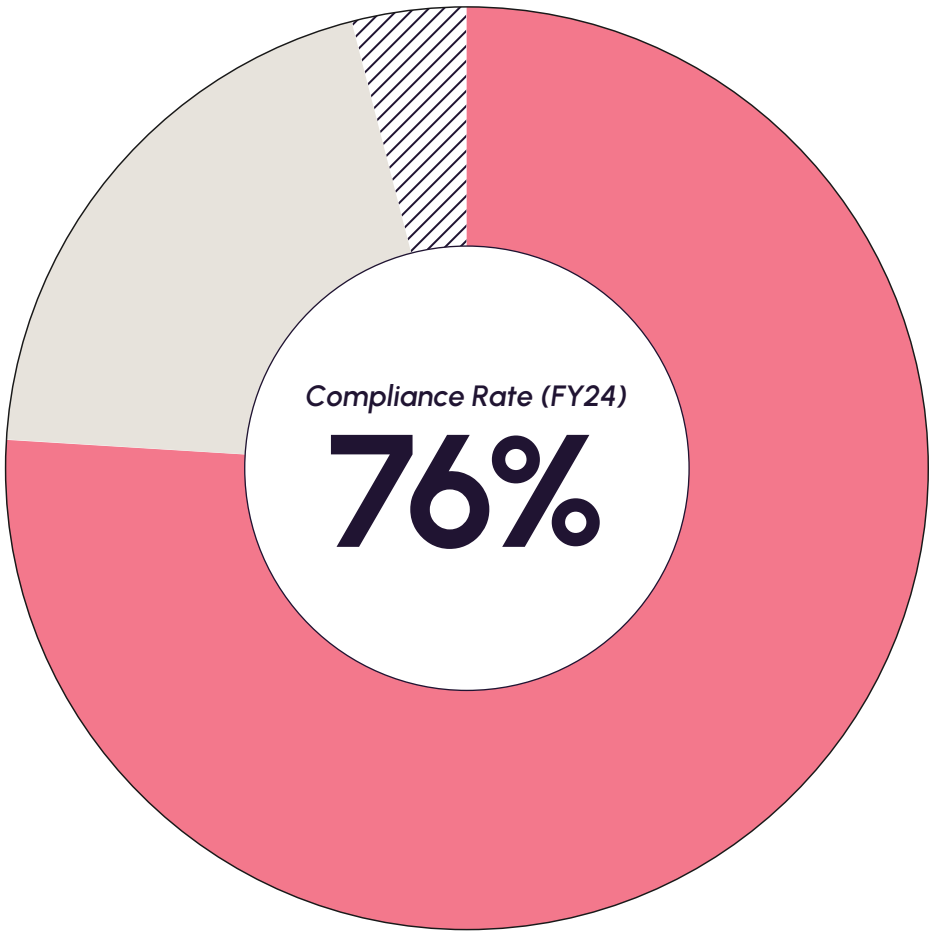


Propane

TSSA conducts periodic inspections of propane facilities to oversee and manage the state of compliance across all licensed sites in Ontario.

Figure G5: Periodic Inspection Results

- ***76%:*** *Inspections passed*
- ***20%:*** *Inspections failed*
- ***4%:*** *Other outcomes*



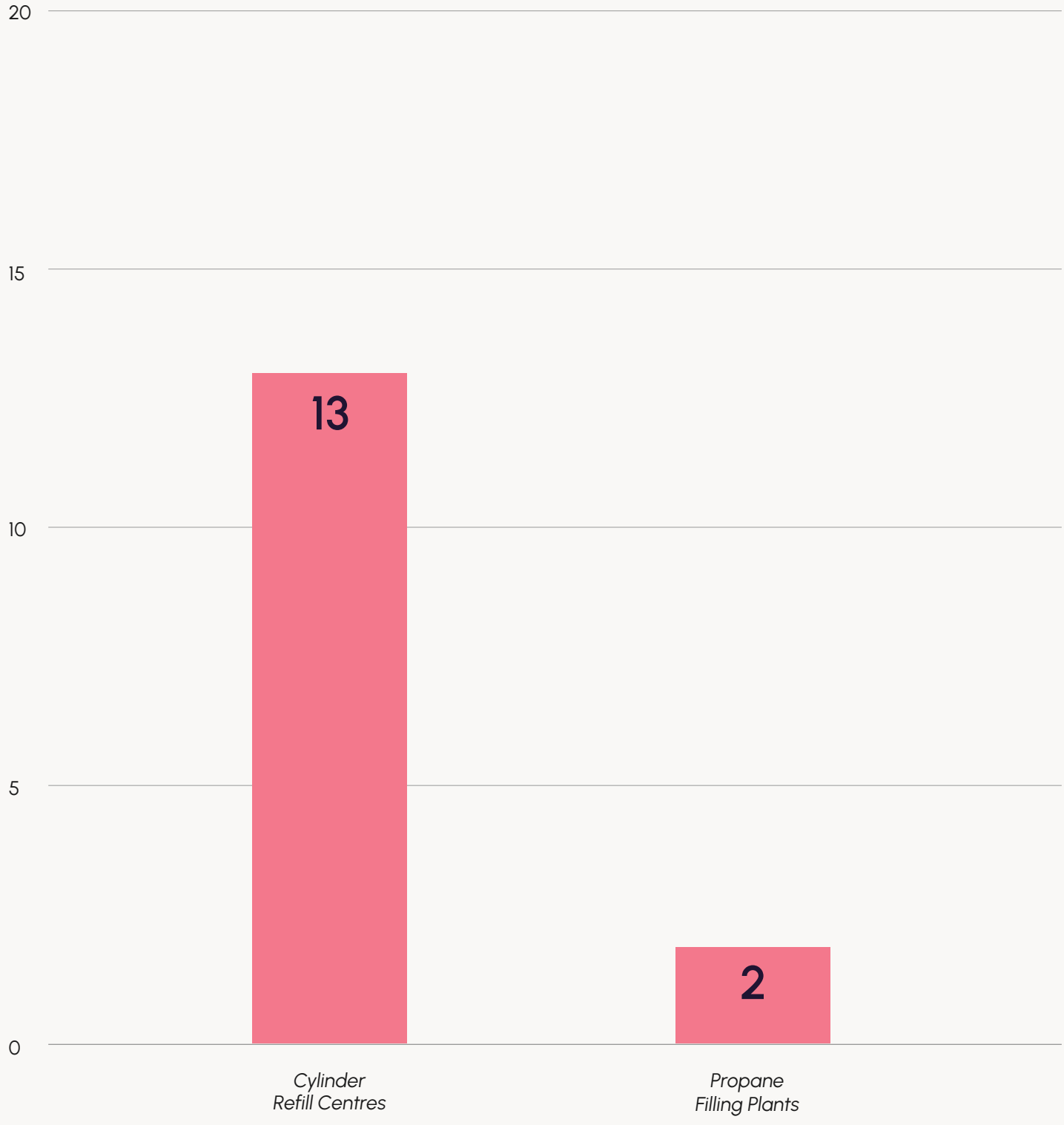
Top High-risk Issues from Periodic Inspections (2024)

Compliance Issue	*Total Number of Orders Issued*	*Percentage of Total Number of Orders Issued*
No Record of annual inspections must be conducted by authorized personnel	37	22.98%
No fire extinguisher (portable) is installed/available	21	13.04%
No proof of training records on employees who are handling propane	16	9.94%

Figure G6: High-risk Licensed Propane Sites in FY24

Number of High-risk Propane Sites **15**

Percentage of High-risk Inventory **1.42%**

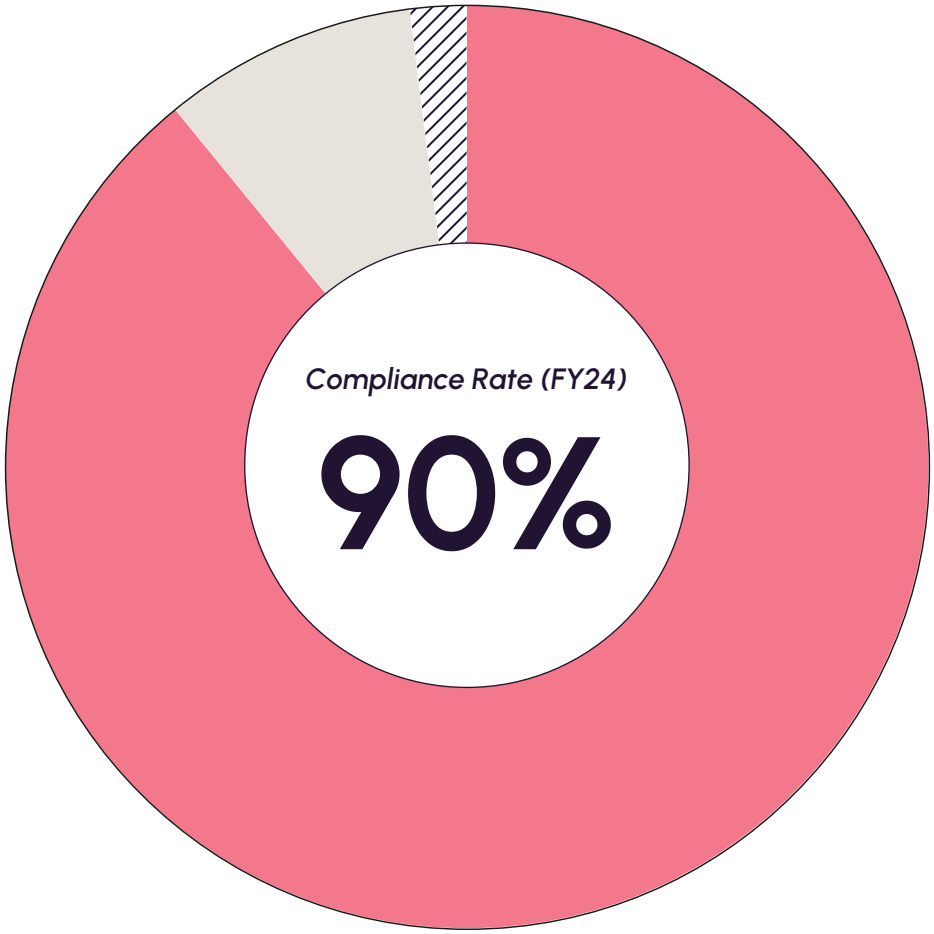


Heating Contractors

TSSA conducts periodic audits on heating contractors to monitor their safety and risk management practices.

Figure G7: Periodic Inspection Results

- ***90%:*** *Inspections passed*
- ***9%:*** *Inspections failed*
- ***1%:*** *Other outcomes*



Top High-risk Issues from Periodic Inspections (2024)

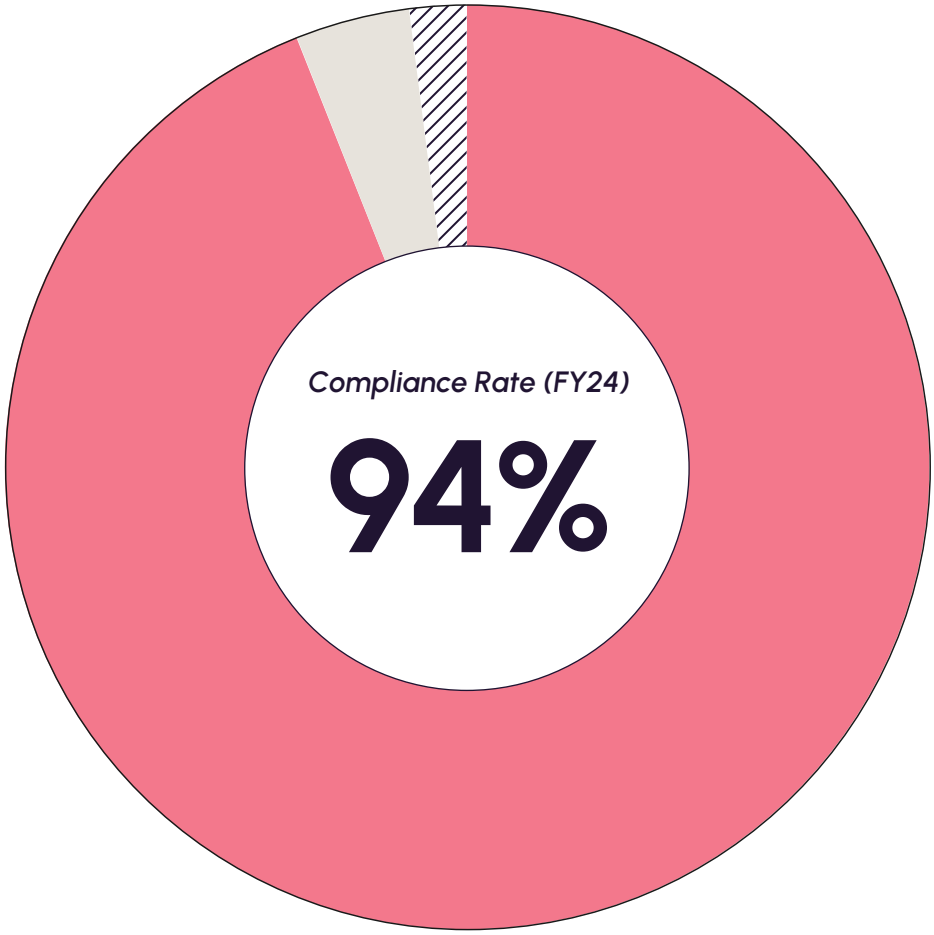
Compliance Issue	*Total Number of Orders Issued*	*Percentage of Total Number of Orders Issued*
Develop a program to ensure your employees comply with Ontario regulations	139	21.19%
Ensure that accidents/incidents are promptly reported to TSSA and no one interferes with the scene unless an inspector grant permission	121	18.45%
Ensure that you employ certificate and/or ROT holders and they promptly report and respond to any unacceptable conditions that pose an immediate hazard	86	13.11%

Petroleum Contractors

TSSA conducts periodic audits on petroleum contractors to monitor their safety and risk management practices.

Figure G8: Periodic Inspection Results

- ***94%:*** *Inspections passed*
- ***4%:*** *Inspections failed*
- ***2%:*** *Other outcomes*



Top High-risk Issues from Periodic Inspections (2024)

Compliance Issue	*Total Number of Orders Issued*	*Percentage of Total Number of Orders Issued*
Ensure personnel comply with act	1	25.00%
Ensure that a facility has at least two fire extinguishers	1	25.00%
Ensure there is a prominently displayed sign at the facility that specifies which types of portable containers are suitable for filling with gasoline	1	25.00%

Inspections Conducted in Fiscal Year 2024

Inspection Type	*Full Compliance*	*Non-Compliances Found*	*Other*	*Grand Total*
FS Modification Insp	133	38	0	171
Inspection - FA/Var/Info	1,144	96	14	1,254
FS First/Install	1,012	341	16	1,369
FS Audit	2,138	2	33	2,173
FS Periodic	1,555	918	34	2,507
FS Other Inspection	1,685	2,713	4,614	9,012
Grand Total	**7,667**	**4,108**	**4,711**	**16,486**

Case Study: Hiring Unauthorized Personnel Causes Risk of Explosion at Printing Plant

↗ *The utility meter that was tempered with by an unauthorized individual*

↗ *The printing press not approved for use in Canada*

Background

During the summer of 2023, a potential explosion was averted at an industrial facility in Southern Ontario. A new printing press, not approved for use in Canada, was installed and started to signal operational issues during testing. Further complicating the matter, an unauthorized individual tampered with the gas meter set, creating an unsafe environment and posing a significant risk of explosion or fire if gas components failed. The unauthorized alteration to the gas supply caused damages to many components that were exposed to the elevated gas pressures, resulting in some costly replacements.

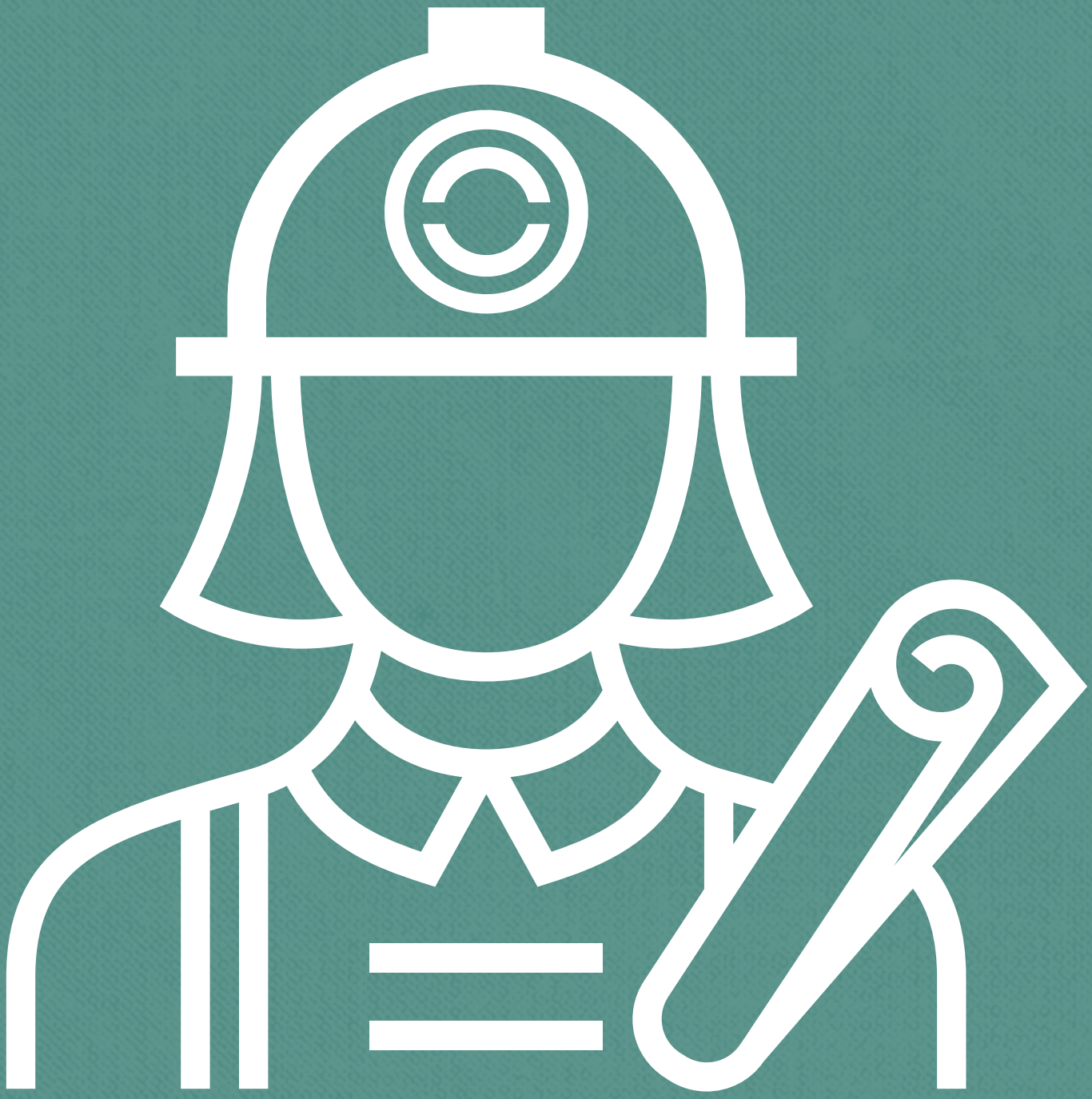
TSSA Analysis and Actions

The incident was reported to TSSA after a safety partner detected an alarming level of gas pressure. TSSA's investigation revealed that the printing company and the overseas manufacturer of the machine were unaware of compliance requirements in Ontario and hired unauthorized personnel for the installation work. TSSA issued orders to the non-compliant contractors and worked with safety partners to mitigate immediate risks, including resetting gas pressures and deactivating affected appliances.

Recognizing the need to educate the printing company, TSSA provided clear guidance to plant management and contractors regarding permissible repair and replacement work, while emphasizing the importance of following Ontario's safety regulations. Subsequent inspections, conducted after the field approval by TSSA's engineering team, ensured that the printing press met Ontario's safety standards.

"This case really drives home how vital it is to hire authorized contractors for fuels work in Ontario," said Debbie Goslin, TSSA's lead investigator of this incident. "Qualified professionals are extensively trained in local safety requirements and have the knowledge and experience to guide their clients through the safe installation and maintenance of equipment."

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.

At a Glance

Compliance Rate FY24

48%

Registered Plants

3,821

Operating Engineers / Certificate Holders

10,841

Incidents, Injuries and Fatalities

The **total incidents have doubled this year compared to the 10-year average**, while the number of injuries and fatalities have remained consistently low.

Incidents

Reporting Period	*Incidents*	*Non-Permanent Injuries*	*Permanent Injuries*	*Fatalities*
10-year average	9	0	0	0
2024	18	0	0	0

Incidents Currently Under Review*

Reporting Period	*Incidents*	*Non-Permanent Injuries*	*Permanent Injuries*	*Fatalities*
2024	17	0	0	0
2023	4	0	0	0

*Open incidents as of 2024-05-01

Incidents per 100 Operating Plants in Ontario in FY24

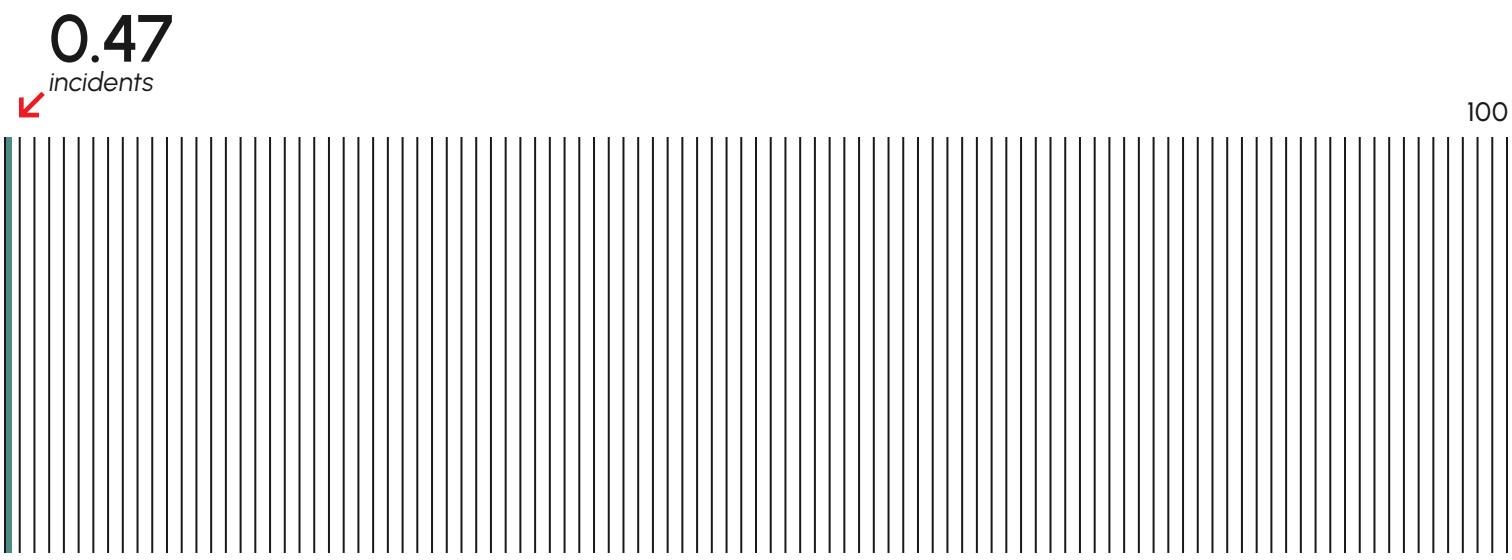
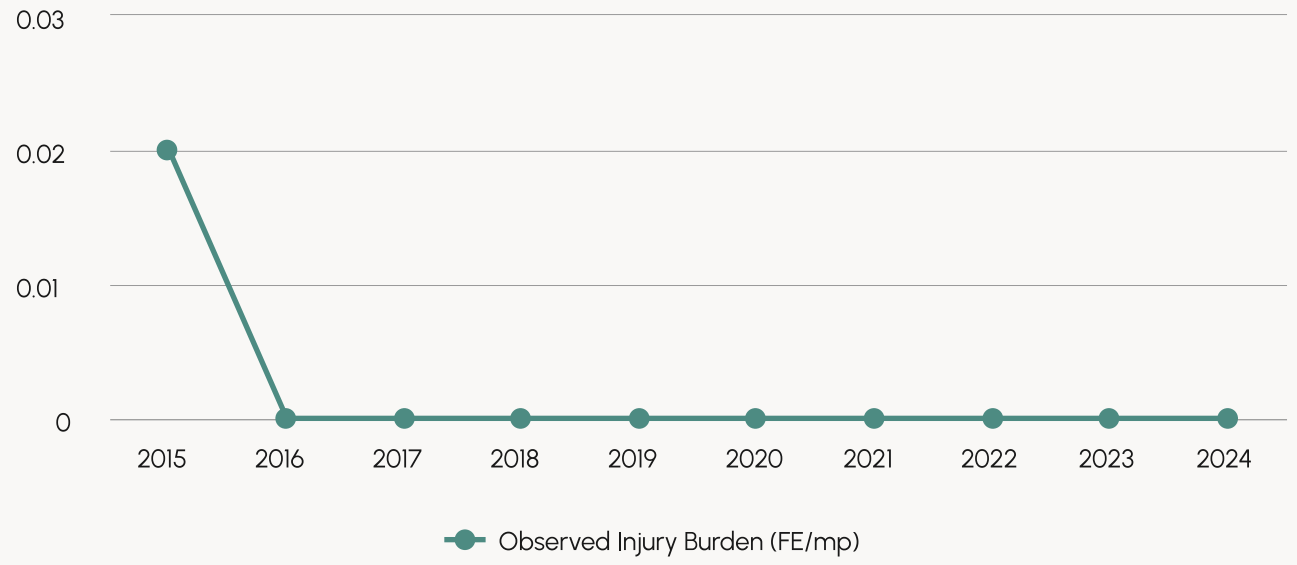
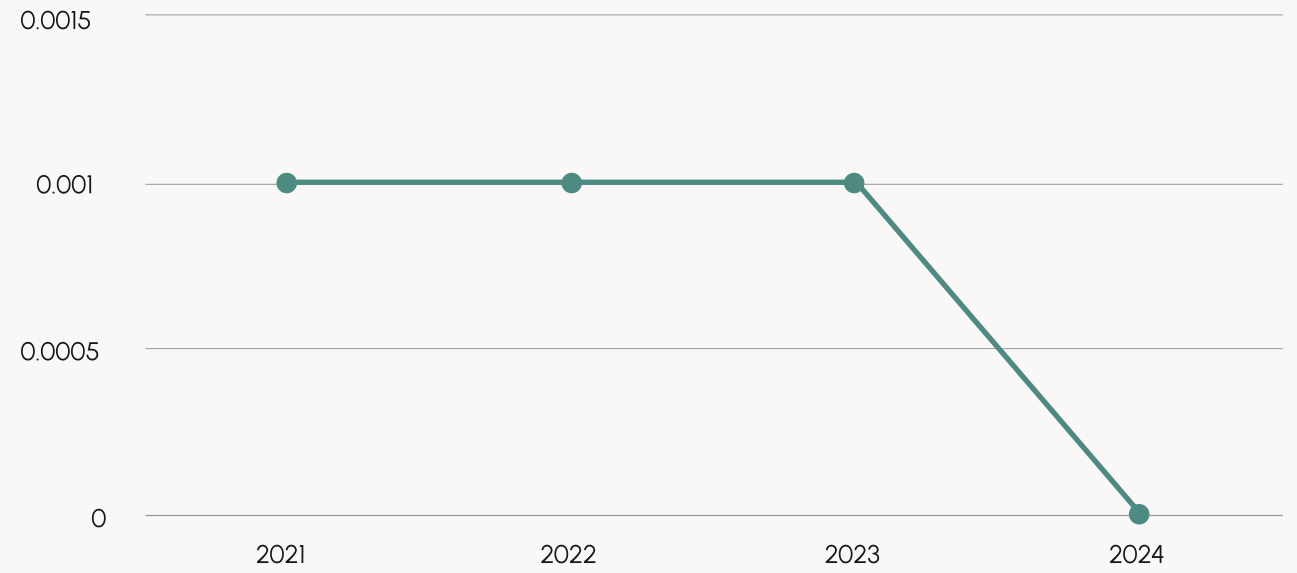


Figure H1: 10-Year Observed Injury Burden Trend for Operating Plants in Ontario



In 2015, two injuries were reported, marking the only instance of more than one injury in the past 10 years. Single-digit injuries were reported in 2016 and 2023.

Figure H2: Risk of Injury or Fatality for Operating Plants (2021-2024)



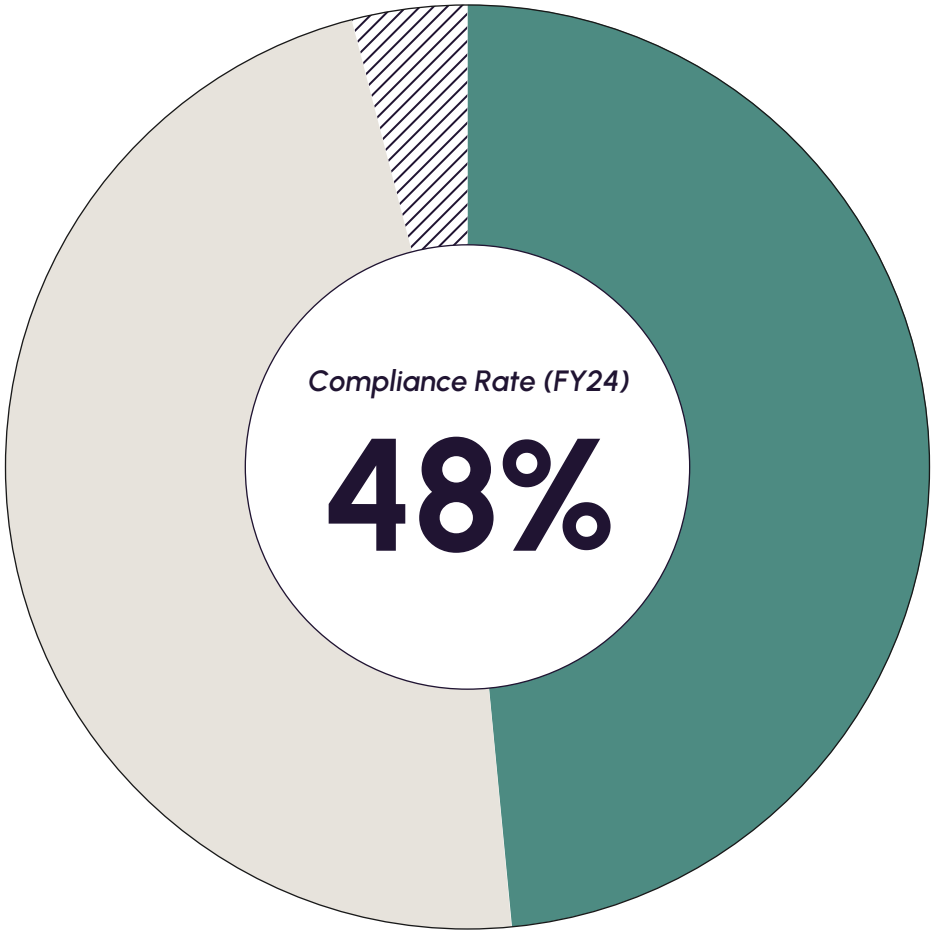
TSSA's Risk of Injury or Fatality (RIF) estimates the potential for injury or fatality by performing a Monte Carlo simulation on 10-year historical data. In FY24 it calculated that the RIF in operating plants would be 0.000 FE/mpy (Fatality Equivalent per million people per year).

Inspection Results

TSSA conducts a variety of inspection types including periodic and non-periodic inspections every year; the below is a breakdown of the results of periodic inspections conducted in FY24.

Figure H3: Periodic Inspection Results

- ***48%**: Inspections passed*
- ***47%**: Inspections failed*
- ***5%**: Other outcomes*



Inspections Conducted in Fiscal Year 2024

Inspection Type	*Full Compliance*	*Non-Compliances Found*	*Other*	*Grand Total*
Other Inspection	4	3	0	7
Investigation	4	2	24	30
Follow-Up Inspection	117	49	2	168
Initial Inspection	145	157	32	334
Periodic Inspection	1,203	1,012	69	2,284
Grand Total	**1,473**	**1,223**	**127**	**2,823**

Figure H4: High-risk Operating Plants in FY24

Number of High-risk Operating Plants **77**

Percentage of High-risk Inventory **3.15%**

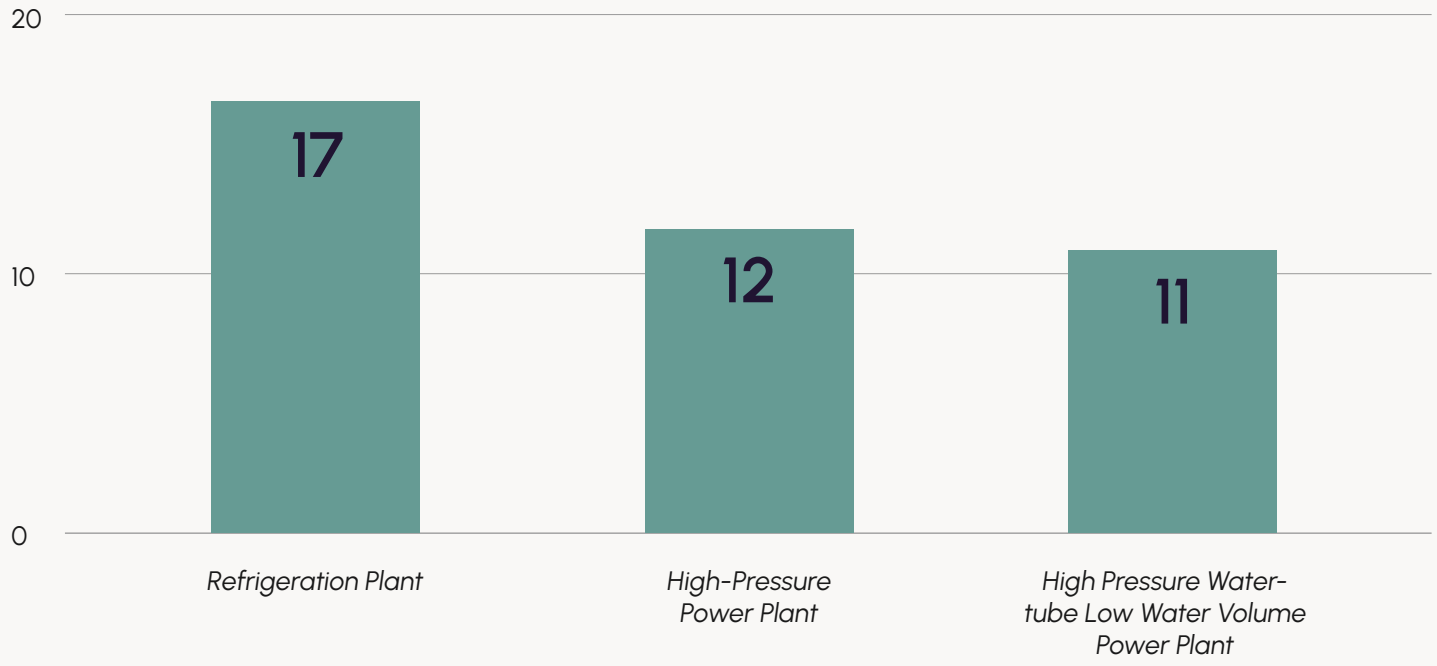
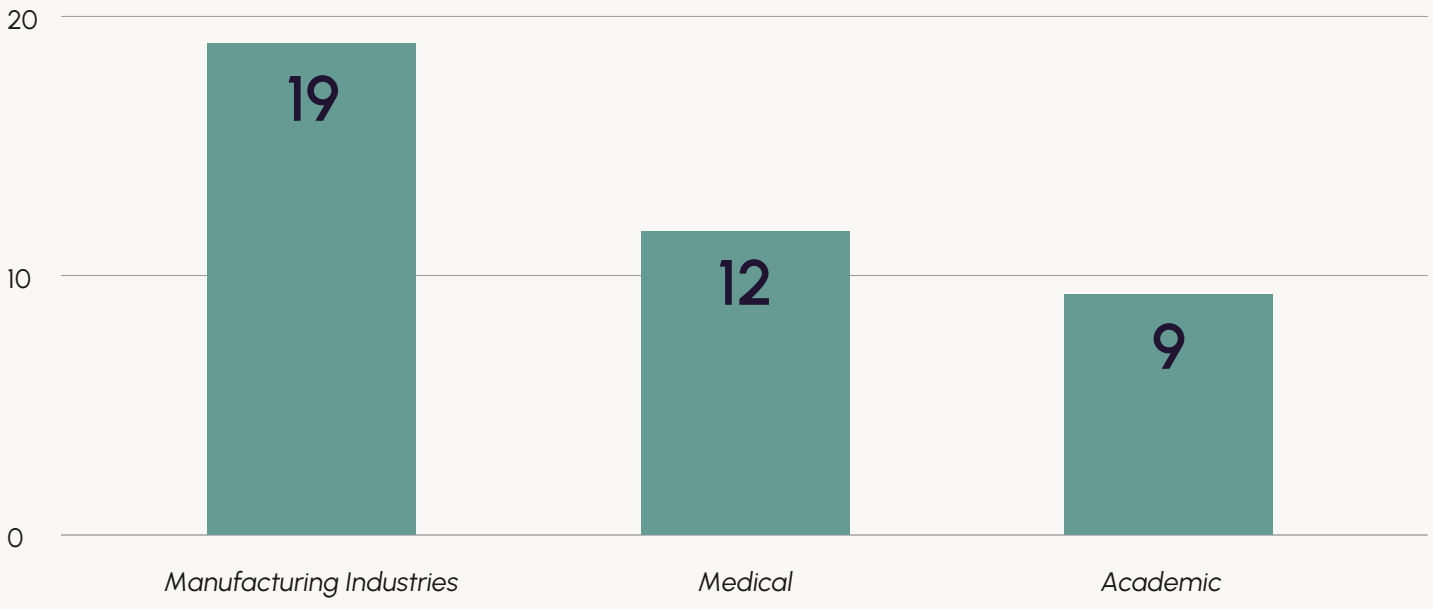


Figure H5: Top High-risk Plant Function Types FY24



Top High-risk Issues from Periodic Inspections (2024)

Compliance Issue	*Total Number of Orders issued*	*Percentage of Total Number of Orders Issued*
Safety concerns not rectified	247	14.21%
Refrigeration plant safety valves over 5 years old not maintained or replaced	172	9.90%
It is necessary that in order to comply with Class T Room requirements, the deficiencies as noted below shall be corrected	144	8.29%

Case Study: Unnoticed Corrosion Causes Ammonia Leak at a Cold Storage Facility

The failed valve was replaced by a new one

The corroded shut-off valve from which ammonia gas leaked

Background

In spring 2024, emergency responders attended to an ammonia leak at a cold storage facility in Southern Ontario. The incident occurred on the roof, where a corroded shut-off valve on the hot gas line of an ammonia center evaporator failed, resulting in the release of ammonia gas into the surrounding environment.

The cold storage facility handles perishable goods for distribution across the region and uses ammonia as a refrigerant. The leak was discovered by neighbouring residents who sensed the strong ammonia odour and promptly notified the local Fire Department. Firefighters responded quickly, evacuating nearby residences and establishing a perimeter to contain the hazardous area. There were no reported injuries.

The Ministry of the Environment and Climate Change's Spills Action Centre alerted TSSA to investigate the incident.

TSSA Analysis and Action

TSSA inspectors examined the ammonia piping system, focusing on the failed shut-off valve and its surrounding components. They conducted interviews with facility personnel, including engineers and maintenance staff, to gather information about the maintenance history and operational protocols related to the refrigeration system.

The investigation revealed that the shut-off valve had corroded under the insulation, compromising three out of four threaded fasteners that were securing the valve bonnet. This corrosion weakened the sealing of the valve, causing release of the toxic gas.

According to TSSA's data, 17 refrigeration plants were identified as high-risk in FY24, representing 22% of all high-risk plants. Among the top high-risk issues identified during periodic inspections of operating plants, problems with the maintenance or replacement of aged safety valves at refrigeration plants ranked second.

"Proactive maintenance and rigorous safety measures are essential in industrial settings," said Adrian Van Maanen, TSSA's inspector responsible for investigating the incident. "The risk of an incident like this could have been reduced through preventative inspection, including thorough checks under the insulation of critical piping sections that are susceptible to corrosion. By addressing potential vulnerabilities early on, we can work towards improved safety for both plant workers and the community."

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