

# REINVENTING THE SAFETY ALERT SYSTEM

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## ABSTRACT

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Safety alerts are an important tool for communicating risks and signalling actions or directives. They are typically issued by organisations when an accident or incident occurs or where key risks and hazards are identified that threaten workers' safety.

This paper looks at the current role that safety alerts play in the electricity sector and questions the poor dissemination of alerts within organisations and across the wider industry. It identifies the barriers and defamatory pressures that tend to suppress the production or sharing of alerts and highlights the duties and privileges that should serve as a counterpoint.

It looks at the quality, quantity and relevance of alerts, and also at the roles suppliers, manufacturers, networks and contractors (as PCBUs) play in their production. It notes the typical bias of alerts towards workplace issues and risks; and asks if the focus of alerts can be widened to cover public, private and boundary risks.

This paper takes a fundamental look at who has the information to make the industry safer, and highlights the importance of capturing anecdotes, 'trade secrets' and mistakes, to lead to a more reflective learning environment.

Citing governance best practice, this paper argues how an open safety alert system can identify critical risks and help protect organisations from unprotected disclosures ('Whistleblowers') whilst improving the safety culture and the management of assets.

## **INTRODUCTION**

Safety alerts are an important tool for communicating risks and signalling actions or directives. They tend to reach their audience quickly and are more concise and accessible than policy documents. Often where policy, procedures and practice have been seen to have drifted apart, safety alerts can communicate the issue.

They are typically issued by organisations when an accident or incident occurs or where key risks and hazards are identified, that threaten workers' safety. They are sometimes used as administrative controls where a hazard is identified, while an event is further investigated or to convey the findings of an investigation and the lessons learnt.

This paper looks at the safety alerts released through the Electricity Engineers' Association (EEA) since 2016, and at the safety alerts reports that the EEA produces.

The paper does not seek to question EEA's safety alert reporting but seeks to take an objective look at deficiencies and biases in safety reporting frameworks.

## **BACKGROUND**

The genesis of this paper has come from the author's realisation that the risks in a distribution network get greater the further downstream you go and the closer you get to customers (consumers). For example, the greater exposure factors and increasing difficulties with power system protection at lower distribution voltages. Very few safety alerts are driven by breaches of the Electricity (Safety) Regulations (ESR) [17], most are the result of workplace events, with their primary focus the Health and Safety at Work Act 2015 (HSWA) [18]. Also, very few safety alerts address public safety issues and are biased towards the acute workplace issues and incidents.

This paper is also driven by the observation that the safety alerts that are currently produced by the Electricity Distribution sector go nowhere near to addressing the wider asset and critical risks, and also by the sense of frustration at the things that have been missed.

## **SAFETY ALERTS IN THE ESI**

Looking through the more than 250 alerts [1] that have been issued through the EEA since 2016 gives us a snapshot of safety events and concerns in the Electricity Supply Industry (ESI). Searching through the previous alerts going back as far as 1999 also allows us to identify similar incidents or events that have occurred and to try and identify underlying issues.

The first thing that is noticed when looking at the alerts is the strong bias towards electricity transmission, with more than two thirds of alerts coming from the transmission workspace. This rises to three quarters if we add to this; the distribution contractors that operate in the transmission sector.

According to Worksafe New Zealand, there have been 63 notifiable incidents from April 2016 to March 2018 (2 Years) triggered by HSWA requirements: 36 in distribution, 18 in transmission and 9 in generation. This would imply that, all else being equal, there should be twice as many alerts being shared by the distribution sector as transmission and half as many by the generation sector. Given that the transmission sector typically shares more than 75 alerts per year and distribution less than 30, the distribution sector would therefore need to increase its output of shared safety alerts of a factor of five to be comparable to that of the transmission sector.

This suggests significant ‘under-reporting’ in the distribution sector of safety issues through the EEA’s safety alert notice board or a significant ‘over-reporting’ by the transmission sector.

### **CATEGORIES OF SAFETY ALERTS**

Alerts come in many forms and it is sometimes difficult to decide how the incident should have been framed or categorised. For example, often alerts framed as quality alerts could have profound safety implications down the track, this is why it is important that alerts are shared widely.

It is noted that EEA is trying to move the industry to more standardised reporting using a template for submitting safety alerts [3]. It is not known how many alerts are submitted using the template, but it is assumed that the EEA use the template to codify industry alerts for production of their biannual report. It is good that the EEA has defined categories [4] but, as shall be discussed later, it may be prudent to change the workplace focus of these definitions. Transpower and its contractors use at least five different titles for their alerts starting from a First Alert issued after an incident, a Safety Alert, a Quality Alert, an Environmental Alert through to a proactive Safety Start alert. Often the alerts cross several of the EEA template categories. It would therefore be useful to confine each alert to a single category i.e a notification alert of an incident then to produce a second alert to communicate the safety directives etc.

Fatality	Injury	Health / Illness	Near Miss	Public Safety	Asset or Equipment	Hazard Observation
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Table 1: Safety alert categorisation as used by the EEA in their reporting template and biannual report:

Given the demand for lead indicators in the industry it would be useful to include a proactive alert category, for example Transpower’s ‘Safe Start’.

It is also noted that the EEA categories are not compatible with those of the UK based, National Equipment Defect Reporting Scheme (NEDeRs) reporting system [5]; with the first four categories being roughly equivalent to the NEDeRs - Dangerous Incident Notification (DIN), but it is unclear where a suspension of operational Practice (SOP) would fit if it were not connected to an incident. It is also considered that the Asset and Equipment classification be widened to include recalls and National Equipment Defect Reports (NEDeR). There is debate on where near misses fit in relation to lead or lag indicators; it is considered by the

author that near misses along with SOP and NEDeR alerts be treated as lead indicators, this is discussed later.

## DISTRIBUTION CHANNELS

EEA distributes the submitted alerts to around 450 recipients across the electricity sector (generation, network companies, contractors, consultants and equipment suppliers) including individuals in 60 corporate member organisations [8]. There may also be multiple recipients inside organisations where the alerts are forwarded on. EEA also distributes the alerts that it receives from the NEDeRS scheme in the UK. The EEA is the main distributor of safety alerts in the Electricity Industry in New Zealand, with a lesser amount, predominantly generators and retailers, posting and cross-posting through the StayLive scheme [6].

There are several other distribution channels that overlap the electricity sector (for example NZTA's Zeroharm scheme [7] and Chorus New Zealand) but these are not covered here. What is clear is that there are many distribution channels but not much content being delivered [8].

## QUANTITY OF ALERTS

Since 2016 there have been over 250 alerts issued through EEA [1], of these 70% are related to workplace injuries or incidents, and 8 were environmental alerts not related to safety.

Year	2014	2015	2016	2017	2018
EEA (NZ)	102	105	117	106	29
EEA (UK&IRE)			56	55	24
EEA (AUS)			1		
StayLive			15	12	10

Table 2: EEA Safety Alert and StayLive Alerts Notice Boards

## ALERTS: PRODUCTION & REPORTING BIAS

The disproportionate number of alerts from the transmission sector has been noted earlier, this is accompanied by an additional bias towards incidents that happen in the workplace. This bias of alerts seems to stem fundamentally from the dominance of the HSWA, and using it as a starting point for safety management in an organisation. The only mention of regulatory compliance issues are when minimum approach distances (MADs) are encroached through ECP 34 [9].

It is hard to find any alerts that do not stem from the workplace and from a workplace perspective; with over 70% of them being injury, incidents or near misses. There are several alerts that are framed as workplace issues, but which have a disproportionate public safety implication, this is also discussed later.

It is also noted that there have only been two safety alerts from suppliers and manufacturers since 2016; with both of these, being general worldwide alerts, relating to working at height safety equipment (harnesses and attachment). It should be strongly stated here, that suppliers and manufacturers are PCBUs and have a great deal of *influence* over the safety outcomes that result from the use and operation of their products.

## **ALERTS: QUALITY OF INFORMATION**

Alerts, save for incident notifications, require an update or correction at some point. It is therefore vital that authors introduce controls to allow and welcome feedback and comments. It is noted that of the alerts issued in 2016 less than half of the contact details given are still valid.

Safety alerts create a picture, but only part of the picture; often safety alerts are vague or guarded with ephemeral contact information. It is concerning how hard it is to get further information from organisations about events and products, or the background to or context of the event. The person is typically ‘too busy’, has left the organisation, is just the publisher not the author or the information is shrouded in the guise of commercial sensitivity. Given the new views that are starting to dominate safety thinking around the world that sees *behaviour as an outcome and not a causal factor* [10] and *error as being a symptom of deeper trouble* [11], it is of vital importance that the full stories get told around incidents and discoveries.

The relevancy of many of the alerts, to them, has also been raised as an issue by several people. If the distribution sector followed transmissions reporting rate, the annual number of alerts could be expected to rise to 500. It could be concluded that better targeting and tagging of alerts is required and will likely be required in the future.

## **BOUNDARY ISSUES**

The majority of the safety alerts focus on the networks direct risks from safety. Often, as noted above, these risks get conflated and dominated by commercial risk. As the HSWA matures, the focus and emphasis should extend to the overlapping duties outlined in the Act. The work undertaken by the EEA and the interim guide is noted here [12]. This however is only part of the picture, the boundaries can be blurred, unknown or obfuscated due to commercial risk or a political lobby process [13][14][15][44].

The boundaries and overlaps include:

- An electrician working at a main switchboard, where his arc flash exposure, (which he is typically not aware of), can be heavily *influenced* by the electricity network.
- Where the public, scaffolders and builders interact with old *unmaintained* service connections at properties which networks are slow to acknowledge ownership and/or responsibility of.

- Where a distribution network owned streetlight cable extends into a roading authority owned streetlight column installation in the road reserve.
- Where a power pole is placed too close to a road. Here the roading authority and network have overlapping duties, again proportionate to their influence.

The overlapping duties above may not be properly considered or understood before or after an incident. The duties extend far beyond those outlined in the HSWA as they extend into the public space and to many third parties; they may be covered by other legislation or requirements.



Figure 1: The network-consumer boundary between a distribution transformer and the main switchboard (MSB) of a regional council pumping station



Figure 2: The domestic network-consumer boundary

## **PUBLIC SAFETY ISSUES**

Public safety issues are poorly represented in the EEA's safety alert system at present with less than 7% (8/121) of the alerts identified as public safety issues in the EEA's reports [20]. This number can be increased if we include workplace issues that were driven by asset defects or faults for which the public has ongoing exposure. An example of this would be the manufacturing defects and installation practices described, over an 18 months period, for overhead compression sleeves.

It must be acknowledged that the EEA Safety Alert Notice Board [1] is framed as being for *accident and incident reports*. It is subjective as to which asset, equipment failures, incidents,

or hazard observations should be reported. Many of the ‘non-incident’ alerts that are currently being reported, could be considered a ‘by-catch’ of notifiable-incident reporting. The *public safety* definition [4], used in EEA’s reporting uses the term 'significant risk' from the Electricity Act to allow for a different public risk tolerance. It should be noted however, that the public's risk tolerance is typically seen as an order of magnitude lower than that of an ESI worker [34][35][36].

It is hoped that the industry would be applying a different trigger threshold for notifications for public exposure to that of a typical notifiable workplace event [22]. If the public must be exposed to *immediate or imminent* danger on a *worksite* or *serious harm* before public incidents are notified, then this is a concern.

## **PUBLIC SAFETY IN GENERAL**

It is evident that the EEA has tried to separate out the public safety issues that arise from industry operations from those of the workplace, in the same way legislation has with the introduction of the (public) safety management systems, thus facilitating a risk based approach to safety [34].

## **NOTIFICATION OF INCIDENTS**

In the Electricity Industry there are two main paths to the notification of accidents to workers and members of the public; one is through the Electricity Act section 16 and the other through HSWA. Worksafe may also refer other matters, issues or incidents to Energy Safety for assessment; these could include Regulatory breaches or nascent risks for policy development. Worksafe itself acknowledges that it has set a high bar for mandatory notification and reporting under HSWA [23], with industry following [22]. As discussed previously, it is intended that the threshold for reporting public incidents be lower than those for workplace incidents.

## **IMPORTANCE OF NEAR MISSES AND PRECURSOR EVENTS**

It is seen by the author that the term *near miss, as defined by the EEA*, (see Appendix, [4]) should be reviewed and replaced with *ESI notifiable incident* to align fully with the HSWA, with the term *public safety* redefined as a *public notifiable event*. Given the subjective nature of *significant harm* and *immediate or imminent* it is also seen as important to create near misses definitions for both of these categories. It also follows that hazard observation should perhaps be an interim classification prior to assessment or split. Alternatively a separate public exposure flag could be used with notifiable, near miss and hazard observation categories.

Defining and lowering the threshold for near misses strengthens the case for them to be used as a lead indicator [27]. Greater reporting should capture more of the types of precursor events that lead to serious harm [25][26].

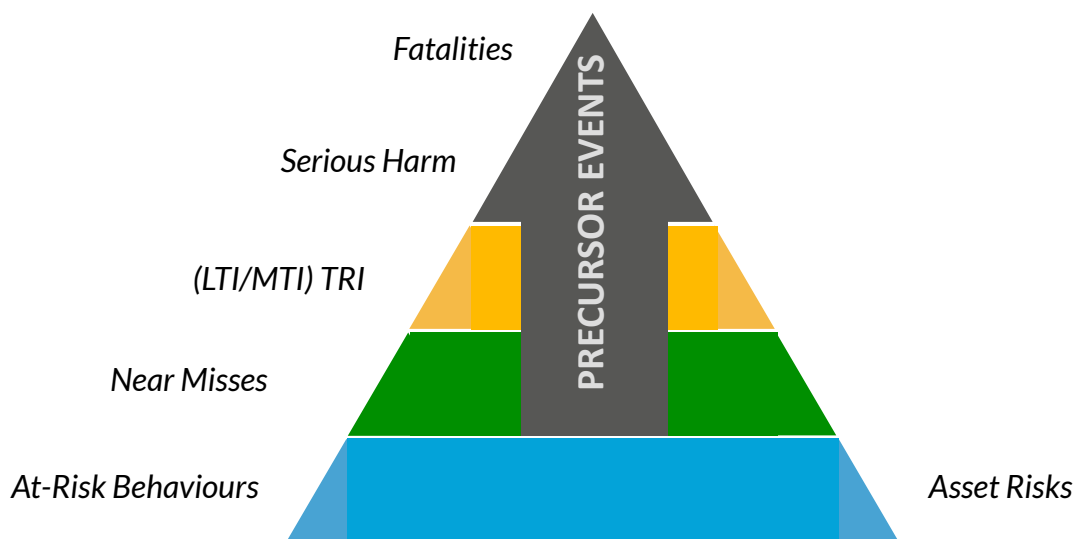


Figure 3: Enhanced Safety Triangle [26]

For organisations to have a clear view of potential incidents they need to be able to distinguish minor events from serious ones, otherwise they may focus their prevention work on relatively unimportant scenarios [25]. It is therefore important for organisations to establish minimum reporting standards for their organisation and its particular context [24]. These need to be communicated well and be supplemented with examples. The target market for such a document should not be a regulator or an auditor but the 'blunt end' of the organisation.

Instead of reactively relying on events and incidents, networks need to harvest individual knowledge and actively encourage safety observations to make determinations of what are unsafe equipment, practices or situations. Safety Alerts can be used to define examples of what is safe or unsafe and set expectations; these would be driven by the settings in the minimum reporting standards.

The Electricity (Safety) Regulations require that all assets not be unsafe. This was a shift from the previous regulation that required assets to be safe and has encouraged a risk management approach to be taken. This change was supposed to enable *a gradation of permissible risk to match what actually exists in electricity generation facilities, electricity distribution networks* [34].

### **CAPTURING ANECDOTES, 'TRADE SECRETS' AND MISTAKES**

You only have to look at Worksafe's Statement of Intent [37] to see the strong parallels to the medical sector, with terms like the *evidence-based targeting of health and safety risks* now appearing: this goes beyond 'compliance'.

The electricity supply industry should follow the lead of the medical industry, where anecdotes are a powerful tool that can be used to develop an 'early warning system' for



precursor events. Just as anecdotes have proved very important in medicine [31], it is vitally important that the ‘side effects’ of running an Electricity Network are captured as well as “off-label” practices and past practices. To use the words of Sydney Dekker: *we must find the symptoms of deeper trouble* [11].

The ‘pre-existing conditions’, past mistakes and latent risks need to be identified and captured. Normalised historic practices and mistakes need to be documented and managed in the context of today's risk framework. Decisions made 10, 20, 50 years ago, cannot be allowed to govern today's injury rates.

It is important we stop blaming, start reporting and develop a more reflective learning environment.

“Safety is a people problem .. put away your accident statistics and start listening to the real experts on safety: your employees.” [16].

## **CAPTURING UNKNOWN KNOWN - THE UNTAPPED KNOWLEDGE**

An unknown known is something that is only known to some members of a team, or something that is known to a team, but its significance is not appreciated. An open reporting system with good information flows can help identify the unknown knowns: these blindspots need to be identified and managed. If an organisation puts a facade around the things that are known then we start to enter the area of nonfeasance.

## **IMPORTANCE OF THE SAFETY ALERT PROCESS**

Safety reporting and the production of safety alerts, if done correctly, should be the start of a conversation that harvests the wisdom of the crowd. Good alerts define the key issues, root causes and can help set strategies and objectives. The framing of an issue as a safety alert can allow it to be viewed more objectively; the separation of an incident from any chronic or systemic issues also facilitates clearer thinking. As mentioned earlier, the reporting of an incident should not be conflated with the underlying issues, as an asset owner and contractor have different duties and influences which can conflict.

Safety alerts pertaining to existing assets are a good way to document issues and capture the knowledge of the crowd and make a faster transition from an individual knowledge-based business to an organisational knowledge-based one.

It is vital that the safety alerts from all stages of an event or discovery are communicated effectively by Networks and contractors. This includes the wider industry.

Safety alerts should be considered a lead indicator and reported as such. In line with governance best practice [33][45] it is vital that the Board of an organisation get a structured democratised insight into the key safety risks and achievements that are occurring under their governance.

## **DUTIES AND PRIVILEGES**

There are many attendant duties that exist in the operation of the electricity supply industry; they extend far beyond the HSWA and rely on engineers, electrical workers, directors etc. fulfilling their own duties and adhering to their own personal and professional ethics [39] [40]. Central to this is the development of an open environment and a tolerance for speaking-up, and for any bad or good news to travel up in an organisation.

Worker's should be encouraged to take advantage of the privileges that come from their perspective and expertise (qualified privilege) and to report hazards or at-risk practices. They should be encouraged to challenge the barriers put in place by systems and chains of command and be familiarised with the protective disclosure mechanisms that exist within the company. Those that are not listened to tend to either stop talking or speak louder [38].

## **PUBLIC EXPOSURE AND RISK**

More attention needs to be paid to the identification, reporting and managing of public risks. It is important that the public's lower tolerance of risk [34][35][36] is recognised by networks and their focus changed. It is evident that industry is disproportionately relying on public safety campaigns to address public safety issues [30].

In order to identify the *significant risks* to which the public are exposed, asset owners must set a figure for the value of a statistical public life (VoSL). This figure needs to be incorporated into the asset management planning process and explicitly stated in Asset Management Plans.

## **IMPROVING THE MANAGEMENT OF ASSETS**

In order to have good evidence based safety in the electricity supply industry it is vital to have good asset and incident information and data. Capital and operational expenditure should be risk driven, this includes both commercial and safety risks. Safety alerts that relate to assets and that are distinct from incidents are an excellent way define and frame issues.

Far too often distributions networks rely on storms and trees to harvest defective equipment and poor workmanship and hide bad management decisions and mistakes. This is not good enough.

“Rather than being the main instigator of an accident, operators tend to be the inheritors of system defects created by poor design, incorrect installation, faulty maintenance and bad management decisions. Their part is usually that of adding the final garnish to a lethal brew whose ingredients have already been long in the cooking” - James Reason [11].

## **CONCLUSION/SUMMARY**

Safety alerts should be used to start a conversation that harvests the wisdom of crowds, and that of the whole electricity industry. They need to be open, controlled and dynamic.

There are some pretty good systems and processes already in place across the industry. The main problem is, the lack of content for these systems and a lack of resourcing and will to create it. Safety alerts should cover more than acute workplace issues and events. The biggest risks on an electricity network are those risks to the public or third parties interacting with it at the boundaries.

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## APPENDIX 1 - DEFINITIONS

Electrically Unsafe:	Means, in relation to works, installations, fittings, appliances, and associated equipment, that there is a significant risk that a person may suffer serious harm, or that property may suffer significant damage, as a result of dangers arising, directly or indirectly, from the use of, or passage of electricity through, the works, installations, fittings, appliances, or associated equipment.
Notifiable Injury or Illness (HSWA)	As per section 23 of HSWA
Notifiable Incident (HSWA)	As per section 24 of HSWA - Meaning of notifiable incident (1) In this Act, unless the context otherwise requires, a notifiable incident means an unplanned or uncontrolled incident in relation to a workplace that exposes a worker or any other person to a serious risk to that person's health or safety arising from an <b>immediate or imminent exposure to:—</b> electric shock
PCBU	person conducting a business or undertaking
Workplace	20 Meaning of workplace (1) In this Act, unless the context otherwise requires, a workplace means a place where work is being carried out, or is customarily carried out, for a business or undertaking; and (2) In this section, place includes— includes any place where a worker goes, or is likely to be, while at work.
Serious Harm	Under the Electricity Act 1992:  A death, or injury that consists of or includes loss of consciousness or a notifiable injury or illness as defined in section 23 of the Health and Safety at Work Act 2015
NEDeRS	National Equipment Defect Reporting Scheme - The scheme is open to asset owners and network operators but not manufacturers
DIN	Dangerous Incident Notification - A dangerous incident is one where the incident resulted or could have resulted in a fatality or serious injury.
SOP	Suspension of Operational Practice - A notification of a suspension /change in some operational practice
NEDeR	National Equipment Defect Report - A notification of a design or manufacturing defect with an item of plant.

## EEA SAFETY ALERT REPORTING DEFINITIONS

### Type of event

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<b>Fatality</b>	any work-related death of an ESI worker
<b>Injury:</b>	any work-related injury, severe or not, to an ESI worker. Includes electric shocks where the victim was taken for medical assessment and later cleared of any injury, as well as any non-treatment injury such as self-reported pain or discomfort.
<b>Health / illness</b>	any work-related diseases or mental or physical health issues, severe or not, to an ESI worker. E.g. cancers, musculoskeletal diseases, hearing loss, stress related disorders.
<b>Near miss:</b>	<p>any unplanned or uncontrolled incident in relation to a workplace that exposed a worker or any other person to a serious risk to that person's health or safety. (This definition is based on the Health and Safety at Work Act's definition of "notifiable event" but not limited to the lists of exposure under the Act or other relevant Regulations.)</p> <p>For the purpose of safety reporting, 'near misses' may include any incident that led to equipment or property damage and had the potential to result in physical harm, as well as situations where work was completed in unsafe conditions with serious potential for harm.</p>
<b>Public safety:</b>	any incident or situation that resulted in, or presented a significant risk of, serious harm to any member of the public (general public or non-ESI workers) or significant damage to property.
<b>Hazard observation:</b>	a situation or thing that has a potential to cause death, injury, or illness to a person. Includes observations on unsafe behaviours, practices, work site, etc.
<b>Public safety:</b>	any incident or situation that resulted in, or presented a significant risk of, serious harm to any member of the public (general public or non-ESI workers) or significant damage to property.

<b>Asset or equipment:</b>	any asset or equipment failure or damage incident that did not result in immediate exposure to serious risk to a person's health or safety.
<b>Lost Time Injury or Illness (LTI)</b>	any work-related injury or illness that resulted in the inability to work for one or more whole calendar days commencing at any time after the occurrence of the injury or illness, whether the employee was scheduled to work or not (including weekends and holidays).
<b>Significant harm:</b>	any fatality or injury or illness causing permanent impairment, e.g. amputation, serious burns, loss of eyesight, serious lacerations, asbestosis. (This definition is based on the work done by the StayLive Group – note that the definition of 'serious harm' under the Electricity Act is much broader and includes non-permanent severe injuries such as broken bones, as well as loss of consciousness.)
<b>Restricted Work Injury or Illness (RWI):</b>	any work-related injury or illness that resulted in work restriction or job transfer for one or more whole calendar days after the day when the injury or disease occurred, following the recommendations of either the employer or a registered medical practitioner.
<b>Medical Treatment Injury or Illness (MTI):</b>	any work-related injury or illness that involved medical treatment but did not result in time off work or on light duties.
<b>First-Aid Injury or Illness (FAI):</b>	any work-related injury or illness that involved first-aid treatment but did not result in time off work or on light duties.
<b>Non-Treatment Injury or Illness (NTI):</b>	any other work-related injury or illness that does not meet the definitions of any of the above, e.g. self-reported pain or discomfort. Includes visits to a medical practitioner for medical assessment following an electric shock.
<b>Notifiable event:</b>	a fatality, notifiable injury or notifiable incident as per the Health and Safety at Work Act.

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