

LFI: **Eye Injury** @ Landfill (Hazardous Waste Site)



IOD MTC – 30 April 2024

- Landfill Hazardous Waste Area @ 11H42 -

What Happened..?

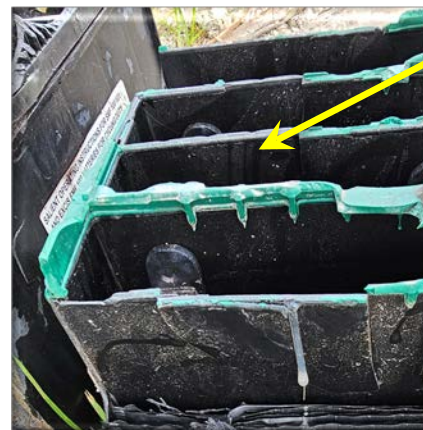
- A damaged truck battery at the Hazardous area was picked up, carried and placed next to the waste bin of the area.
- +ve Act: Housekeeping
- +ve Act: Did not place the damaged battery inside the Hazardous Waste skip.
- As the colleague put the damaged battery down, the acid water solution splashed into the injured's Right Eye, resulting in eye irritation.
- **Moved Object/Hazard:** an exploded battery partially filled with battery acid.

Hazards of Working with Batteries:

- ❖ electrolyte (acid) being splashed/spilled onto the body (including eyes)
- ❖ an explosion due to ignition of gases *both inside and outside the battery.*



Exploded Battery that was moved



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- Landfill Hazardous Waste Area -

What Happened..?

- Batteries shared between Excavator (used for loading truck) and Truck (transports waste material to Landfill disposal).
- Battery in Excavator exploded last month – truck’s installed battery used to start and operate excavator.
- Battery thereafter removed and re-installed in Truck afterwards. Back-and-Forth removal and re-installation done by the equipment operators. 2nd battery exploded prior to this injury.



Battery Compartment of Excavator
(battery acid splash mark on aircon radiator)



Excavator in which installed Battery exploded



Fragments of Exploded Battery



Truck from which Exploded Battery was sourced, and shared with - continuously

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Why...?

Two batteries used in the swapping process exploded – the one that exploded before this injury is fairly new – critical question is what is the correct battery specification of the excavator and of the truck.



- A battery can explode if an improper charger is used to charge the battery. *When a battery is connected to a charger which is meant for a larger capacity battery, the charger starts charging the battery at a higher than recommended current. In such cases the battery life is affected and the active material from the plates start shedding creating an internal short. The internal short causes heat and explosion. In this case the internal short is not because of a manufacturing defect, but due to incorrect charger selection (i.e. incorrect battery swapped to the excavator).*
- Gases released when batteries are charging – hydrogen (very flammable and easily ignited) and oxygen (supports combustion) – can result in an explosion. *The battery can explode if batteries of smaller than recommended size or lower Ah capacity are used. At times – due to non-availability of correct capacity batteries or cost considerations – batteries of lower capacity are fitted to equipment or vehicles.*
- In such cases the charger being of a much larger capacity than required by battery – it tends to overcharge the battery, heating up the battery, causes bubbling & gassing with a possible explosion of battery due to pressure build up within the battery container.

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Signal Word: **DANGER**

Hazard Statements

H203	Explosive; fire, blast, or projection hazard
H302/312/332	Harmful if swallowed, inhaled, or in contact with skin
H314	Causes severe skin burns and eye damage
H350	May cause cancer if ingested or inhaled
H360	May damage fertility or unborn children if ingested or inhaled
H370	Damages organs (blood, central nervous system, kidneys) through prolonged/repeated exposure
H410	Very toxic to aquatic life with long lasting effects
N/A	May form explosive gas (hydrogen) during charging

- PPE: Wear acid-resistant goggles/face shield + gloves, and as relevant an apron when recharging or handling lead-acid batteries.
- *Injured not wearing safety specs or safety goggles – requisition submitted.*
- *Injured wearing pinstripe gloves - which is not acid resistant.*
- *Injured wearing acid resistant one-piece overalls - +ve culture.*
- **Immediate Cause:** exploded battery body cage not intact, leaking acid, pinstripe glove became saturated, battery slipped from hands whilst putting it down on the ground. Remaining acid in body cage then splashed into eyes not protected using safety goggles.



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“At Risk” & Unsafe Behaviours..?

- Following Procedures: deviation by colleague;
 - PPE: safety specs/goggles and acid-resistant gloves not worn.
 - Performing an unauthorised task (not trained and competent to work on vehicle battery).
 - Not reporting the Near Hit – 1st battery that exploded (could have prevented this incident).
- *Following Procedures: deviation by line management;*
 - *Registration/investigation of Near Miss on IMS (likely heard about it somehow).*
- Following Procedures: Organisational MHSA compliance;
 - Provision of PPE (spectacles) as required (injured performing a job outside scope)
- *Use of Protective Methods:*
 - *Lack of knowledge of hazards present.*
 - *Improper use of PPE (incorrect gloves)*
 - *PPE not available – business challenge.*
- Lack of Awareness:
 - Lack of judgement – task may not be done when the correct PPE is not available (mine manager instruction).
 - Lack of judgement – do not perform a task that is the responsibility of another job discipline (unless so authorised).

“At Risk” Conditions..?

- Transportation / Equipment & Tools;
 - Defective vehicles – batteries in some vehicles cannot properly hold their voltage charge. These batteries must be tested (hydrometer & voltage) by the garage and replaced as new – business critical company vehicles.
- *Business Challenge: cash flow financial constraint necessitating business critical ranking;*
 - *Available funds limited, but its' unavailability enables dormant and unfamiliar hazards to surface injuring personnel (Inadequate ID of critical safe behaviour).*

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Root Causes..?

- Human Factors:
 - Mental Stress – frustration (unable to change current financial challenge)
 - *Behaviour – Inadequate ID of critical safe behaviour (goggles and acid resistant gloves to be worn)*
 - Behaviour – Inadequate reinforcement of critical safe behaviour – performing a task outside responsibility.
 - *Behaviour – inadequate management/leadership – promotion of relative financial ranking of safety critical equipment.*
 - Behaviour – Inadequate ID of jobsite work hazards.
 - *Behaviour – inadequate incident reporting system (awareness of criticality of both verbal reporting and registration on IMS)*
- *Inadequate Safety Meetings / Safety Interactions / Safety Stewardship;*
 - *Promotion of awareness of safe behaviours.*
- Inadequate Purchasing Process:
 - Cash flow not available for operating requirement of cash generating business.
- *Inadequate Reinforcement of Works Procedures (MAT):*
 - *Performing a job task outside scope of competency.*
- Inadequate Communication:
 - Lack of awareness of safety and health risks – near misses.

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Lessons Learned..?

- Do not perform a job at work outside your scope of work (competency). Doing a task at home, does not mean that you have the competency to do so at work.
- *If Near Misses / Near Hits are not reported, someone will be injured soon thereafter.*
- The PPE specified to be worn within an area on the plant is mandatory for a reason – to prevent non conformances such as this one to hurt us (safety specs would have prevented battery acid from splashing into the eye).
- *Cash Flow submissions must put a higher priority ranking to equipment needed (batteries) for cash generating units of the business that are in operation, versus other units that are being preserved.*
- Maintaining the HSE-MS (MBO) is very useful for monitoring and managing PPE – confirming the undertaking signed that colleagues will adhere to mandatory and permit PPE requirem

Thank You

“Do your little bit of good where you are;
its those little bits of good
that when put together
can change the world”

Desmond Tutu