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Explosives Inspectorate
Resources Safety & Health
Queensland

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Electrical component failure on ammonium nitrate handling and transfer equipment

What happened?

Recent instances of corroded electrical components have resulted in a fire on a Mobile Processing Unit (MPU) and a no-flow condition of an ammonium nitrate emulsion (ANE) pump.

How did it happen?

Damaged electrical components in the vicinity of ammonium nitrate product were subject to corrosion. Routine maintenance and pre-start inspections failed to identify and replace affected wiring, solenoids, actuators and switches.

In one instance, a wiring harness with damaged insulation on a MPU bin lid actuator energized resulting in a small fire.

In another incident, an internally corroded actuator energized and started a NAPCO™ ANE pump while the mine re-load was unattended.

Key issues

Critical hazards associated with ammonium nitrate and ANE that affect electrical components include:

- Fire due to arcing of electrical components, cables and wire looms, from inadequate/damaged ingress protection
- Fire due to resistance generated heat in electrical components affected by corrosion
- Unplanned detonation due to inadvertent activation of equipment / ANE pumps without warning.

Where ANE pumps are inadvertently activated, or where ANE pumps fail to shut down, no-flow events introduce heat into the ammonium nitrate emulsion, generally under confinement. This can lead to thermal decomposition of ammonium nitrate emulsion and an unplanned detonation event.⁵

Recommendations

- Where there is a risk of corrosion to electrical wiring and components from ammonium nitrate or ANE all fittings and components should have a rating in accordance with relevant standards.
- Workers using mobile and fixed plant / equipment should conduct thorough pre-operational checks. This is to ensure that external wiring, solenoids, actuators and switches are operational and the ingress protection is not compromised.
- Review safety and security management systems, to ensure that preventative maintenance incorporates the testing and examination of electrical components subject to ammonium nitrate and emulsion exposure.

Investigations are ongoing and further information may be published as it becomes available. The information in this publication is what is known at the time of writing.

We issue Safety Notices to draw attention to the occurrence of a serious incident, raise awareness of risks, and prompt assessment of your existing controls.

References and further information

1. [Queensland Explosives Act 1999](https://www.legislation.qld.gov.au/view/html/inforce/current/act-1999-015) (https://www.legislation.qld.gov.au/view/html/inforce/current/act-1999-015)
2. [Queensland Explosives Regulation 2017](https://www.legislation.qld.gov.au/view/html/inforce/current/sl-2017-0150) (https://www.legislation.qld.gov.au/view/html/inforce/current/sl-2017-0150)
3. [Queensland Explosives Inspectorate Information Bulletin 53](https://www.rshq.qld.gov.au/safety-notices/explosives/storage-req-security-sensitive-ammonium-nitrate-ssan) (https://www.rshq.qld.gov.au/safety-notices/explosives/storage-req-security-sensitive-ammonium-nitrate-ssan)

4. [Australian Standard 4326 - 2008](https://store.standards.org.au/product/as-4326-2008) (<https://store.standards.org.au/product/as-4326-2008>).
5. [AEISG Code of Practice - Storage and Handling of UN3375](https://www.aeiscg.org.au/wp-content/uploads/STORAGE-AND-HANDLING-OF-UN3375-COP-EDITION-5-JULY-2018.pdf) (<https://www.aeiscg.org.au/wp-content/uploads/STORAGE-AND-HANDLING-OF-UN3375-COP-EDITION-5-JULY-2018.pdf>).
6. [AEISG Code of Practice – Mobile Processing Units](https://www.aeiscg.org.au/wp-content/uploads/AEISG_Code-of-Practice_Mobile-Processing-Unit_Edition-4_September18.pdf) (https://www.aeiscg.org.au/wp-content/uploads/AEISG_Code-of-Practice_Mobile-Processing-Unit_Edition-4_September18.pdf).

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