



SAFETY ALERT

Overheated tyres require miners to use self-rescuers

INCIDENT

While operating a RAM car (rubber-tyred mobile plant) in an underground coal mine, the driver heard a bang and noticed a distinctive smell and white smoke-like substance coming from the rear of the machine. A brown smoke-like substance followed.

Miners at the face of the same heading smelt the substance in the ventilation current, put on their self-rescuers and walked out of the heading. A few miners became nauseous and complained of headaches. Some miners were sent to hospital.

CIRCUMSTANCES

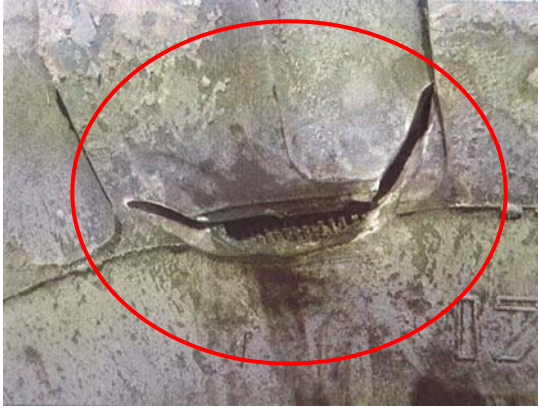
1. Prior to the incident the rubber-tyred mobile plant travelled in and out of the mine, then back into the mine, approximately 18km in total.
2. The rubber-tyred mobile plant was loaded on each trip. The exact weight and speed was unknown.
3. The tyres were fitted with high-pressure (HP) rubber liner (RL) inserts.

INVESTIGATION

Investigations into the incident have revealed:

1. Just after the incident, the front tyres were cool to touch while the rear tyres were warm to touch. Note: the rear tyres carry a higher load than the front tyres.
2. Both rear tyres overheated internally with the RL inserts failing from thermal degradation (internal heating).
3. The internal heating created internal pressures which subsequently burst the side wall of the tyre and allowed products of combustion gases to escape.
4. The white and brown smoke-like substances included toxic gases from products of combustion of the rubber compound.
5. Twenty-four hours after the incident, when the tyres and inserts were inspected in a workshop, there was sufficient heat inside the RL insert such that a person's hand could not remain on the RL insert for any period of time.
6. The rubber-tyred mobile plant was capable of travelling significantly faster than the maximum safe operating speed of the tyre assembly.
7. The original tyres supplied by the mobile plant manufacturer (20.5R25) were replaced with a tyre of lower capacity (17.5R25).
8. The rubber-tyred mobile plant was required to be de-rated from 20 ton to 13 ton payload to operate within the safe load rating of the tyre assembly.
9. Hungry boards were fitted to the machine to increase volumetric capacity.
10. The initial failure of the RL insert may have occurred some time (weeks) earlier.
11. The rubber-tyred mobile plant was owned by a hire company.

12. There was no information on the rated duty cycle or capacity of either the tyre or RL insert available at the mine.
13. The rubber-tyred mobile plant driver was not made aware of any duty cycle (speed, load or distance travelled) limitations of the tyre assembly.
14. A similar incident occurred six months earlier at the mine.
15. Similar incidents have occurred previously at other mines with air-filled and urethane-filled tyres.



The initial pressure split in the tyre



Heat degradation of RL insert

RECOMMENDATION

1. The *Occupational Health and Safety Act 2000* and *Occupational Health and Safety Regulation 2001* require that adequate information about plant must be provided to persons to whom it is supplied to ensure its safe use.
2. Tyres, RL inserts and urethane fills on mobile plant should only be operated within their maximum permissible duty cycle and tyre pressure rating (tonnes kilometres per hour - TKPH).
3. RL inserts and urethane fills should undergo sufficient testing to ensure they can perform at least equivalent to that of the air-filled tyre they are being fitted to.
4. **Designers, manufacturers, suppliers of mobile plant** should:
 - Only fit tyres to mobile plant that can safely carry the specified load at specified speeds.
 - State any limitations on the tyre duty cycle (carrying capacity or load, speed or maximum distance that can be travelled in one hour) for the safe use of the mobile plant.
 - Provide information on axle loads and ratings for alternative tyre options.
5. **Manufacturers and suppliers of tyres, RL inserts and solid fills** should provide adequate information on:
 - The safe duty cycle (load, speed and distance rating) for the tyre assembly, with supply of each tyre assembly. This should consider tyre pressures, RL inserts and urethane infill ratings.
 - Lifecycle maintenance inspections and checks on the tyre assembly.
 - Marking of tyres to identify the fill medium.
6. **Users of mobile plant** (mines, hire companies, contractors) should:
 - Only operate plant in accordance with the designer's, manufacturer's and/or supplier's information or as otherwise instructed by a competent person.
 - Implement systems to ensure mobile plant is only fitted with tyres that are capable of safely operating within the intended duty cycle and TKPH rating.

- Provide adequate information to all drivers to ensure mobile plant is only operated within its safe limits of operation.
- Implement maintenance and pre-operational systems to verify tyres are safe to use, including checking correct tyre pressures, checking for any tyre or insert/infill degradation and with consideration to *AS 4457 Earth-moving machinery - Off-the-road wheels, rims and tyres – Maintenance and repair*.
Note: Any increase in tyre deflection increases internal heat energy and lowers tyre duty cycle.
- Implement emergency systems to manage/control the risk of harm to people (including people inbye) associated with any tyre fire, tyre explosion or internal tyre heating.

NOTE: Please ensure all relevant people in your organisation receive a copy of this Safety Alert, and are informed of its content and recommendations. This Safety Alert should be processed in a systematic manner through the mine's information and communication process. It should also be placed on the mine's notice board.

Signed



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MINE SAFETY OPERATIONS BRANCH
NSW DEPARTMENT OF PRIMARY INDUSTRIES

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