NSW DEPARTMENT OF
PRIMARY INDUSTRIES

SAFETY ALERT

Information to be supplied on safe operating grades for mobile equipment

INCIDENT

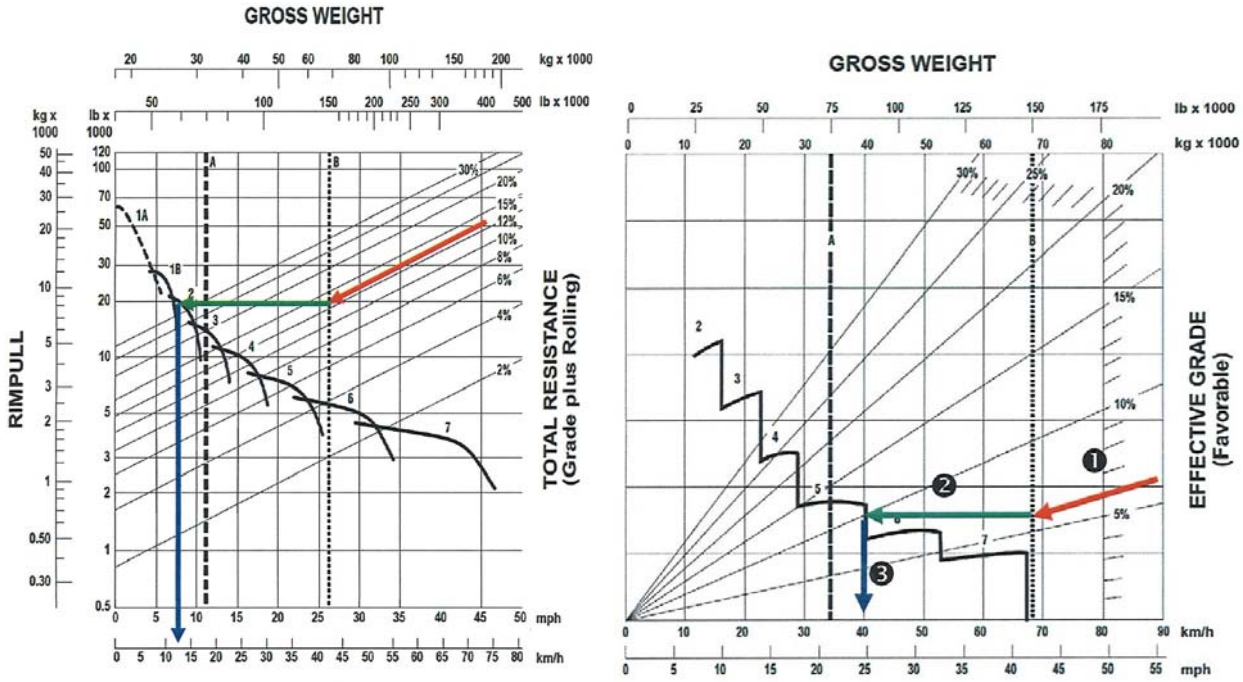
It has become apparent that mobile equipment manufacturers' information on transmission and retarder performance is being misinterpreted as safe grades for use.

This misinterpretation may result in mobile equipment being used on steeper grades than those in which the mobile equipment can safely stop, in the event of a transmission failure.

CIRCUMSTANCES

Typically equipment manufacturers supply gradeability and retardation charts.

In conjunction with a statement that the braking systems comply with AS 2958.1 or ISO 3450, mines may be misinterpreting these charts as safe grades for use.



Typical gradeability / retardation performance charts for trucks.

Note: Read down the resistance line to intersect with the vehicle weight, then read across for gear obtainable and down for speed.

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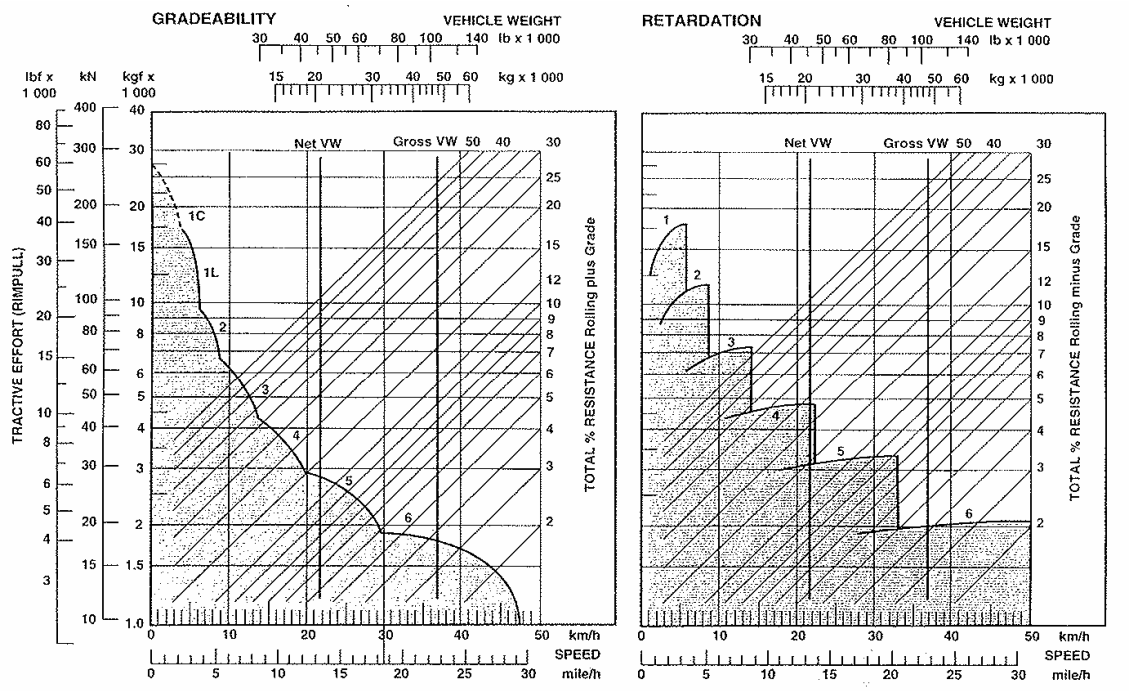

Typical gradeability / retardation performance charts for articulate vehicles.

INVESTIGATION

Investigations have found:

1. Typically manufacturers' maintenance documentation indicate:
    - A fault in the engine or transmission will cause the retarder to automatically disengage and the transmission to shift to a neutral position.
    - A retarder failure or neutral transmission requires the application of the service brake (foot pedal) to stop the vehicle.
    - Braking systems comply with ISO 3450 or AS 2958.1.
2. The service, secondary and park brake may not be able to stop and hold the mobile equipment on all grades and loads as identified in the retardation charts following a failure of the engine or transmission.
3. This particularly applies to articulated six-wheel drive equipment which appear, from performance charts, to be able to operate on very steep grades (greater than 25%).
4. An instruction plate on the correct gear/speed selection when descending grades is typically not available in the operator's cabin as required by ISO 3450 or AS 2958.1.
5. For some equipment:
    - There is no fail safe brake (spring applied) for emergency applications.
    - Both service and secondary braking systems utilise the same components and rely on stored air pressure alone for their operation.
    - The failure of a single component and/or leaks significantly reduces braking performance.
    - A risk assessment of the failure modes of the braking system is often not available.

Section 11(1) of the *NSW Occupational Health and Safety Act 2000* states:

> *(1) A person who designs, manufactures or supplies any plant or substance for use by people at work must:*
>
> *(a) ensure the plant is safe and without risk to health when properly used, and*
>
> (b) *provide ... adequate information about the plant ... to the person to whom it is supplied to ensure its safe use.*

RECOMMENDATIONS

Mines should:

1. Identify all grades on their site where mobile equipment is used.
2. Confirm, with the manufacturer, whether the particular mobile equipment is safe to use on these grades following failure of the retarder or transmission.
3. Review the integrity of the braking systems to ensure they are fit for purpose for the grades being traversed, where written confirmation cannot be obtained from the manufacturer.
4. Ensure maintenance practices on braking systems are consistent with the level of risk for the site haul roads.

Mobile equipment designers, manufacturers and suppliers should:

1. Provide information to end users describing:
   - The performance of the service, secondary and park brake systems.
   - The maximum grade on which the mobile equipment can safely stop and hold, following failure of the retarder or transmission.
   - Operator instructions for descending a grade (see AS 2958.1 & ISO 3450).
   - Practical maintenance instructions that will, if followed, ensure all braking systems remain functional over the life of the mobile equipment.
2. Review the integrity of braking systems to ensure they are fit for purpose for the specified grade of operation

   Guidance is provided in AS 4024, AS 62061, MDG 1010 and National Minerals Industry Safety and Health Risk Assessment Guideline (Minerals Industry Safety and Health Centre – MISHE) for appropriate risk assessment techniques.
3. Ensure mobile equipment braking systems can stop and hold in accordance with the criteria specified in *SA06-13* for all identified retarder performance grades.

This Safety Alert should be read in conjunction with *SA06-12 Maintenance of Safety Critical Systems and SA06-13 Braking Standards for Trucks*

NOTE: Please ensure all relevant people in your organisation receive a copy of this Safety Alert, and are informed of its content and recommendations.

Rob Regan
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NSW DEPARTMENT OF PRIMARY INDUSTRIES