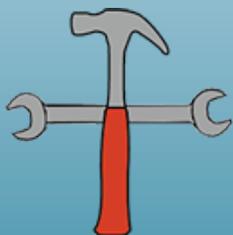


ErgoMine

Haul Truck Audit



Haul Truck Audit Tool



This audit assesses the administrative issues (i.e. training and policies), haul road and pit conditions, and the job tasks and physical equipment that impact the ergonomics and safety of haul truck drivers.

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Haul Truck Audit Instructions

This audit package contains four documents that are necessary to conduct a haul truck audit. A description and intended use of each document is provided below.

1) Haul Truck **Audit Information Page**. This page allows the audit user to record pertinent information to be filed with the audit results and recommendations. A separate Haul Truck Audit Information Page should be used for each location and time when conducting an audit of multiple location or at multiple times

2) **Haul Truck Audit Answer Sheet**. This document can be used to record responses to audit questions, thereby allowing the user to reuse the Haul Truck Audit Questions document multiple times without the need for additional copies of the questions.

3) **Haul Truck Audit Questions Document**. This document contains the full set of audit questions and is arranged in a modular format. This should be used to conduct the ergonomics audit. Please note, to complete modules three and eight you will need a tape measure or other means to measure distance. You will also need equipment to measure dust and noise levels to complete module six.

4) **Haul Truck Audit Recommendations Document**. This document contains all the recommendations for the audit questions. It includes a checkbox beside each recommendation allowing the user to check the recommendation which corresponds to each of the answers recorded on the answer sheet.



Haul Truck Audit Information Page

Name of Auditor: _____

Location of Audit: _____

Date of Audit: _____

Time of Audit: _____

Comments:

Haul Truck Audit Answer Sheet

Office Level

Module 1 – Training

- 1.1 _____
- 1.2 _____
- 1.3 _____
- 1.4 _____

Module 2 – Policy

- 2.1 _____
- 2.2 _____
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Field Level

Module 3 – Haul Road / Mine Pit

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Driver Level

Module 4 – Pre-shift Inspection

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Module 5 – Ingress/Egress

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Module 6 – Driving / Cab Layout

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Module 7 – Loading

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Module 8 – Dumping

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Office Level

Module 1: Training

This module covers how a haul truck driver is trained at your facility. This module requires you to review company policies and can be conducted in an office setting.

- 1.1 Where is the haul truck driver task training delivered?
Choose all that apply:
- a. in classroom
 - b. in truck
 - c. in simulator
- 1.2 Who delivers formal haul truck driver task training?
- a. mine employed trainer
 - b. other driver
 - c. original equipment manufacturer (OEM) trainer
 - d. consultant trainer
- 1.3 What topics are covered in haul truck driver task training?
Choose all that apply :
- a. pre-shift
 - b. seatbelt (e.g., use in all seats in truck)
 - c. jumping from equipment (e.g., when/where appropriate)
 - d. type, use, and testing of brakes
 - e. ingress/egress (e.g., 3-point rule)
 - f. road rules (e.g., speed, passing, driving side, minimum following distances)
 - g. Operation & Maintenance Manuals (OMM)
 - h. haul truck specific hazards
 - i. explanation and identification of blind area(s) around truck
 - j. effect of weather on driving (e.g., braking ability, visibility)
 - k. adjustment of the seats in the haul truck cab
- 1.4 How do you ensure drivers are properly trained to operate a haul truck?
- a. Direct observation only
 - b. Written quiz only
 - c. Written quiz and direct observation
 - d. Other method is used
 - e. No methods in place to ensure drivers are properly trained

Module 2: Policy

This module covers mine and company policies as they apply to haul trucks and haul truck drivers. This module requires you to review company policies and can be conducted in an office setting.

- 2.1 Does your site have a database of all safety (near-miss) incidents? **Yes / No**
- 2.2 Does a mechanic examine a haul truck after receiving a pre-shift inspection report which notes a mechanical hazard? **Yes / No**
- 2.3 Are pre-shift inspection reports reviewed by someone other than the driver before the truck is put into operation each shift? **Always / Only when issues are found / Never**
- 2.4 Does the driver have the option to not drive a truck due to a safety concern which did not cause the truck to be out of service? **Yes / No**
- 2.5 Does anyone other than a mechanic have the authority to put a truck back into service? **Yes / No**
- 2.6 Are drivers required to set the parking brake whenever parking the truck? **Yes / No**
- 2.7 In addition to using the parking brake, are drivers required to physically immobilize the truck when parking such as by using wheel chocks? **Yes / No**
- 2.8 Are drivers required to move forward (not backward) as their first move from a parked position (i.e., first move forward)? **Yes / No**
- 2.9 Are drivers required to honk the horn before moving from a parked position? **Yes / No**
- 2.10 Is there a policy for cell phone (both personal and company provided) usage for haul truck drivers? **Yes / No**
- 2.11 Do drivers listen to music/radio while driving the haul truck? **Yes / No**
- 2.12 What is your company's policy on using seatbelts in haul trucks?
a. all persons in the truck all the time
b. drivers only all the time
c. no policy or other
- 2.13 Are haul truck drivers permitted to request road grading or watering? **Yes / No**

2.14 Are both alternative methods and equipment available for when the grader or water trucks are out of service? **Yes / No**

2.15 Where are the Operation & Maintenance Manuals (OMMs) located for the haul trucks?

Choose all that apply:

- a. cab**
- b. office**
- c. shop**
- d. other**

Field Level

Module 3: Haul Road / Mine Pit

This module covers the design and current conditions of the haul road and other surfaces over which the haul trucks travel. This module will require you to observe the condition of the haul roads and speak with haul truck drivers or other site workers responsible for road conditions. This module should be conducted in the field and requires a tape measure or other means to measure distance.

- 3.1 Are road rules (e.g., who has the right of way, passing acknowledgement, maintaining proper speed, traffic pattern, minimum following distances, driving side) clearly defined and communicated to all drivers? **Yes / No**
- 3.2 Are road rule infractions tracked or documented? **Yes / No**
- 3.3 Have employees reported the presence of excessive dust clouds that reduce driver visibility on haul roads? **Yes / No**
- 3.4 Have drivers reported issues of overwatering of roads or dump areas? **Yes / No**
- 3.5 Are signs present for all stop and yield locations that clearly identify which vehicle has the right-of-way? **Yes / No**
- 3.6 As part of regular road inspections, are signs inspected to ensure that they have not become blocked by vegetation or become illegible from dirt or deterioration? **Yes / No**
- 3.7 Are any areas where haul trucks share the road with any other vehicles clearly identified by warning signs for the haul truck drivers? **Yes / No**
- 3.8 Identify the signs that are currently present on haul roads to locate safety hazards?
Choose all that apply:
 - a. change in road condition/direction
 - b. grade including recommended gear
 - c. intersections
 - d. emergency signage
 - e. traffic patterns
 - f. stop, yield, speed limit
 - g. no passing
 - h. do not enter
 - i. one way
 - j. none of these signs exist

- 3.9 Do all signs on haul roads meet all of the following recommendations? **Yes / No**
- Vertical height of 5 to 8 ft from ground to the bottom of the sign
 - Lateral offset (distance from edge of road to edge of sign) of 6 to 12 ft
 - Retroreflective so that it can be seen in reduced visibility conditions such as nighttime or inclement weather
 - Follow the DOT public road signs format for shape (octagon for stop signs, triangle for yield signs) and color (red with white lettering for stop/yield signs, yellow with black lettering for warning signs, white with black lettering for informational/regulatory)
- 3.10 Are road grades designed to accommodate the equipment with the least braking capability (usually the largest loaded haul truck)? **Yes / No / Don't Know**
- 3.11 Do speed limits vary with location, grade, and model of truck? **Yes / No**
- 3.12 Are the speed limits posted on road signs? **Yes / No**
- 3.13 Are grades greater than 10% present? **Yes / No**
- If yes, proceed to question 3.14
 - If no, proceed to Question 3.15
- 3.14 Are warning signs present indicating the grade of areas with grades greater than 10%?
Yes / No
- 3.15 On haul roads, are any sharp curves located near the top or bottom of a grade? **Yes / No**
- 3.16 Are one-way traffic haul roads at least 2 times as wide as the widest vehicle using the road and two-way traffic haul roads at least 3.5 times as wide as the widest vehicle using the road?
Yes / No

- 3.17 Are all berm heights at least as high and wide (at the base) as the axle height of the largest piece of equipment that uses the roadway (see Figure 1)? **Yes / No**

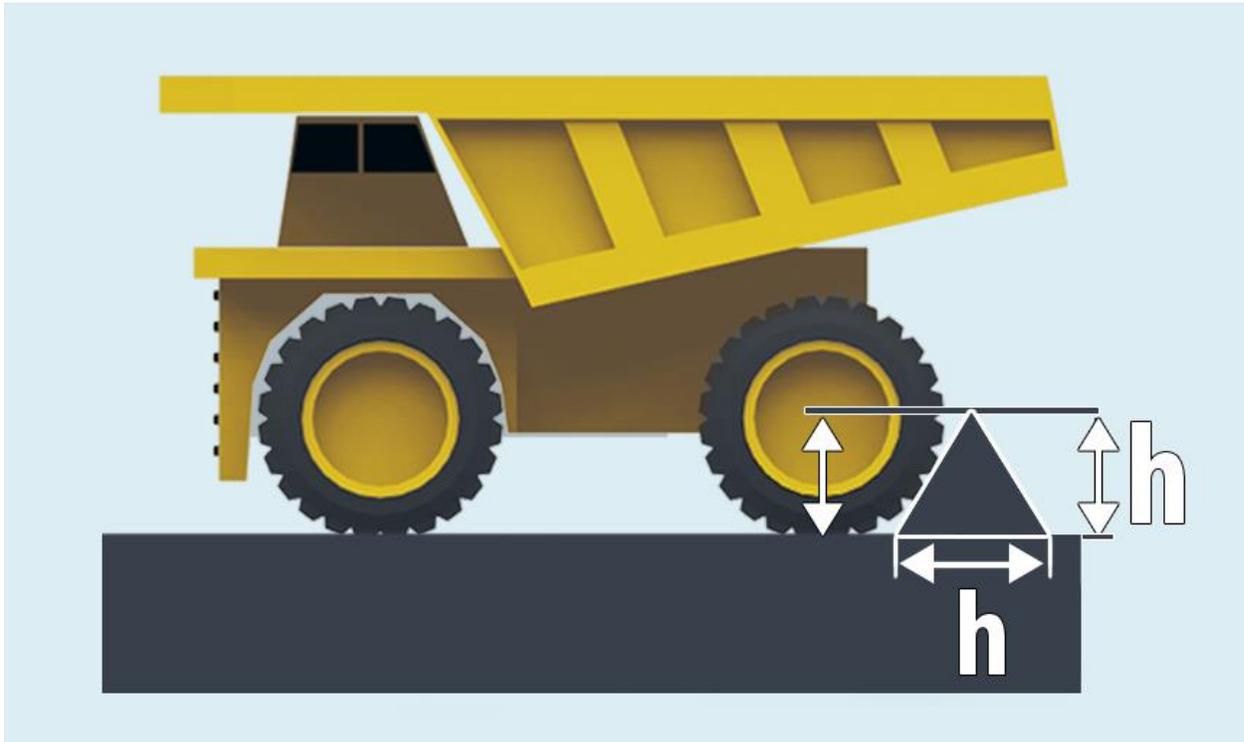


Figure 1. Haul truck next to a berm. The dimension h is the recommended minimum height and width of the berm and is equivalent to the axle height of the largest piece of equipment that uses the haul road.

- 3.18 Are berms inspected at least once a week to ensure that they have not deteriorated?
Yes / No
- 3.19 Are bench faces or stockpile slopes along haul roads inspected for stability and to identify loose material at least once a week? **Yes / No**
- 3.20 Is adequate clearance (including height of bed when raised) from overhead power lines provided on all haul roads? **Yes / No / No power lines present on haul roads**
- 3.21 Are runaway truck provisions in place on all haul roads with a grade greater than 5%? **Yes / No**

Driver Level

Module 4: Pre-Shift Inspection

This module covers the pre-shift inspection as conducted by a haul truck driver. This module will require you to review company policies and the forms used for pre-shift inspection, observe an actual pre-shift inspection conducted by a driver, and directly question haul truck drivers. This module should be conducted in the field. Please have at least 5 haul truck drivers, or all drivers if you have less than 5 complete question 4.19.

- 4.1 Is there a standard form to document the pre-shift inspection of the haul truck? **Yes / No**
- 4.2 Is training provided to cover all topics included on the pre-shift inspection form? **Yes / No**
- 4.3 Is the training for pre-shift inspection conducted by an original equipment manufacturer (OEM) trainer? **Yes / No**
- 4.4 Is the level of competence of a new haul truck driver assessed after initial pre-shift inspection training? **Yes / No**
- 4.5 Are follow-up assessments conducted to ensure haul truck drivers are performing proper pre-shift inspections? **Yes / No**
- 4.6 Are drivers instructed to refer to or use the Operation & Maintenance Manual (OMM) during the pre-shift inspection to assist in identifying defects with truck systems? **Yes / No**
- 4.7 Does the haul truck driver use any aids to supplement the pre-shift inspection forms (e.g., cards with conditions to check for that match each component on the form)? **Yes / No**
- 4.8 Does each make and model of haul truck have an individual pre-shift inspection form designed for that truck? **Yes / No**

4.9 Does the pre-shift inspection form include all the following? **Yes / No**

Examine on the machine:

- safe access to cab
- fluid levels
- engine compartment
- hoses, lines, tubes, and fittings for damage
- drive belts and guards
- electrical system

Examine in the cab:

- mirrors and windows
- wipers
- horn
- seatbelt
- lights and turn signals
- two-way radio and computer
- camera
- backup devices
- emergency steering
- indicators with test switch
- cab environment
- fire extinguisher
- all controls in neutral
- heat, air conditioning, and defroster
- instrument operation
- brakes
- retarder function
- monitoring system

Examine on the ground:

- ground condition
- identification of equipment and personnel around the parked truck
- slip/trip hazards
- truck is secured against movement
- general condition of truck
- leaks
- suspension system damage
- driveshaft
- steering linkage
- tires and wheels
- physical condition of external parking brake
- physical condition and cleanliness of lights
- fire extinguisher and fire suppression system
- radiator for debris and damage
- unusual odors and noises
- excess heat
- air-tank relief valve

4.10 Is a pair of wheel chocks used and in the correct location before conducting an inspection (see Figure 2 for correct placement)? **Yes / No**

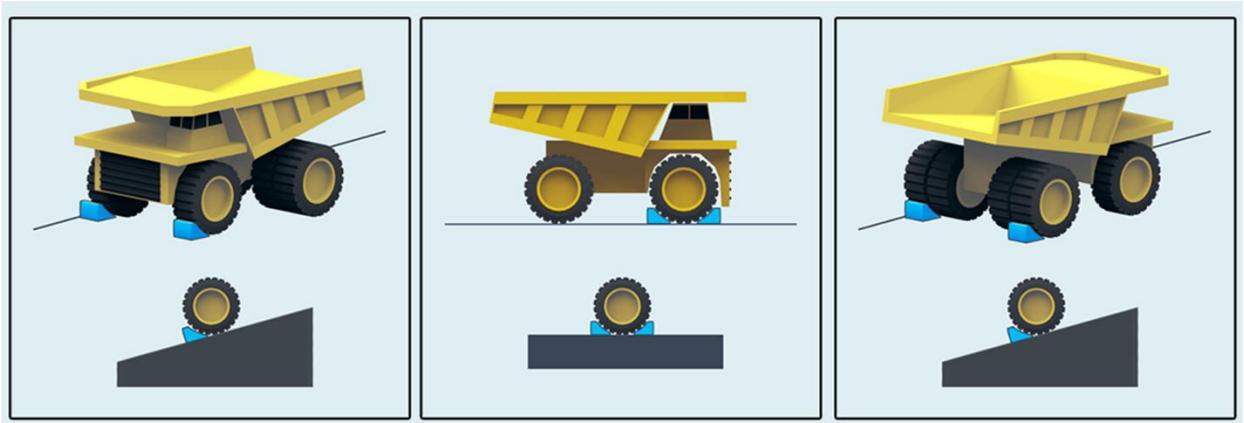


Figure 2. Diagram showing correct placement of a pair of wheel chocks in three different ground conditions.

4.11 Does the haul truck driver communicate with the driver from the previous shift about the mining operations and condition/operation of the haul truck? **Yes / No**

4.12 Are drivers instructed to remove the key from the ignition of the truck and to check that the parking brake is engaged before commencing the pre-shift inspection? **Yes / No**

4.13 Is the engine compartment visually examined for flammable materials and fluids before starting the engine? **Yes / No**

4.14 Is the horn sounded before starting the engine? **Yes / No**

- If yes, proceed to 4.15
- If no, proceed to 4.15

4.15 Is this engine starting signal different from the signal to alert surrounding personnel that the vehicle is about to move? **Yes / No**

4.16 Are all of the following checks performed after starting the engine? **Yes / No**

- functionality of lights
- leaks of air, oil, and fuel
- functionality of the brakes
- steering system
- gauges
- noises or smells

- 4.17 Are any items (e.g., flashlight, pair of gloves, can of de-icer, or paper towels) used to conduct pre-shift inspection? **Yes / No**
- If yes, proceed to 4.18
 - If no, proceed to 4.19
- 4.18 Are these items stored on the truck in a location near the ladder/steps and accessible at ground level for the haul truck driver to use during pre-shift inspection? **Yes / No**

Question for haul truck driver (ask at least 5 drivers or all drivers if less than 5)

- 4.19 Are you provided with adequate time to perform a comprehensive pre-shift inspection?
Yes / No

Module 5: Ingress/Egress

This module covers both the ingress/egress systems on the haul trucks and how drivers choose to ingress/ egress from haul trucks. This module will require you to observe the condition of the haul trucks' ingress/egress system and the drivers getting on and off the haul trucks. This module can be conducted in the field. Please complete questions 5.1 through 5.6 for at least 5 trucks, or all trucks if you have less than 5. Please have at least 5 haul truck drivers, or all drivers if you have less than 5 complete questions 5.7 through 5.14 .

- 5.1 What is the condition of the primary ingress/egress system?
a. good / b. damaged / c. unusable
- 5.2 What is the condition of the secondary/emergency ingress/egress system?
a. good / b. damaged / c. unusable
- 5.3 Is the first step of the haul truck hydraulic? **Yes / No**
- 5.4 Are there any wet contaminants (e.g., oil, grease, mud, or puddles) on the handrails or steps of the ingress/egress system, or the deck of the truck? **Yes / No**
- 5.5 Are the steps/rungs/deck of a nonslip design or coated in a nonslip material to reduce the risk of a slip or fall? **Yes / No**
- 5.6 Are sufficient handrails and steps/rungs provided to enable 3-point contact while getting on or off the truck? **Yes / No**

Questions for haul truck driver (ask at least 5 drivers, or all drivers if less than 5)

- 5.7 When getting off the truck, do drivers (yourself or others) jump from the ladder or platforms to the ground?
Yes / No
- 5.8 Are the exteriors of the haul trucks cleaned at least weekly? **Yes / No**
- 5.9 Are the trucks' ingress/egress systems and decks inspected for any loose or overly worn bolts or structural components at least once a month? **Yes / No**
- 5.10 Do the drivers use 3-points of contact to get on and off the equipment and exit the truck facing the equipment? **Yes / No**
- 5.11 Do the drivers carry anything in their hands during ingress/egress (e.g., pre-shift clipboard or flashlight)? **Yes / No**

- 5.12 Are drivers instructed to only park vehicles in a location with solid ground and in an uncongested area? **Yes / No**
- 5.13 Do parking locations decrease the height of the first step (such as parking with front wheels lowered in a ditch)? **Yes / No**
- 5.14 Are parking docks used to allow drivers to walk off truck onto a rigid platform instead of using truck ingress/egress system? **Yes / No**

Module 6: Driving / Cab Layout

This module covers the design and layout of the cab of the haul truck and activities haul truck drivers complete while operating a haul truck. This module will require you to observe the condition of the haul truck cab, the mine environment in which the haul truck is operated, how haul truck drivers interact with the truck, and directly question haul truck drivers. This module can be conducted in the field and requires measurement of dust and noise levels in accordance with standard MSHA procedures. Please complete questions 6.1 through 6.10 for at least 5 trucks or all trucks if you have less than 5. Please have at least 5 haul truck drivers or all drivers if you have less than 5 complete questions 6.19 through 6.33.

6.1 Is a copy of the Operation & Maintenance Manual (OMM) present in the haul truck? **Yes / No**

6.2 Are areas of hazards such as low clearance, first-step risks, pinch points, and fall risks labeled in the haul truck cab or on the haul truck exterior? **Yes / No**

6.3 Are speed limits posted on the dash of the haul truck? **Yes / No**

6.4 Identify all non-OEM controls used frequently (greater than once per 10 minutes, in all stages of operation) in the cab of the truck (examples are: video monitors, communication radio, music radio, dispatch/GPS screen, switches to control equipment such as fans).

Have the driver reach for each control.

Is the driver able to reach and use the controls without bending their torso? **Yes / No**

6.5 Do the driver's seat adjustments include all of the following? **Yes / No**

- backward/forward direction
- up/down
- preload weight of the driver
- seat pan tilt
- backrest tilt
- headrest with up/down adjustment
- lumbar support with adjustment
- variable damping suspension?

6.6 Are seatbelts in good working condition and available for both the driver and passenger seat in the haul truck cab? **Yes / No**

6.7 Are the seatbelts within the useful life period according to the manufacturer's specifications? (Consult tag on fully extended end of belt) **Yes / No**

- 6.8 Are pins or other mechanisms stored on the truck to allow for immobilization of moving parts (e.g., bed, articulation point, and access cover) before a driver/mechanic needs to enter pinch points or under the bed of the truck? **Yes / No**
- 6.9 Are the following tools provided in the cab of the truck to assist drivers in performing daily maintenance activities (such as window washing, mirror adjustment, lubing, cleaning air filters)?
Choose all tools which are present in the cab:
- a.) paper towels/rags**
 - b.) window washing supplies**
 - c.) tools (such as screwdriver, grease gun, or wrench for mirror adjustment)**
 - d.) none of these tools are present or identified**
- 6.10 Are fueling and/or lubing points located above drivers' shoulder levels? **Yes / No**

This concludes the truck-specific questions.

- 6.11 Are cabs of the haul trucks monitored for dust and noise exposure with and without the windows open? **Yes / No**
- If yes, proceed to 6.12
 - If no, proceed to 6.13
- 6.12 Are the dust/noise levels in compliance with MSHA standards? **Yes / No**
- 6.13 Have drivers complained of incidents of jarring or jolting while operating haul trucks or have you had MSHA reportable injuries due to jarring or jolting? **Yes / No**
- 6.14 Are the trucks physically immobilized by externally applied pins before repair or inspection work is performed in a potential pinch point around the truck (e.g., raised bed)? **Yes / No**
- 6.15 Are tires/wheel rims checked at least weekly for air pressure, tread wear, cracking in the sidewall, and damage to the rim? **Yes / No**
- 6.16 For activities that require the haul truck driver to be on the deck of the truck, what means of fall protection is provided?
Choose any combination of a, b, and c, or choose d if none are present:
- a. barriers (such as handrails)**
 - b. rope off of ingress/egress system**
 - c. tie-off and lanyards**
 - d. no fall protection provided**

- 6.17 Are ingress/egress systems available around fuel station? **Yes / No / Not Needed**
- 6.18 For all times when fueling occurs, are the fueling areas properly illuminated to allow for safe operations (e.g., visibility of nozzle, fuel port on truck, gauges, and ground conditions) around the haul truck? **Yes / No**

Questions for haul truck drivers (ask at least 5 drivers or all drivers if less than 5)

- 6.19 What or who do you go to when you need information about or help with your haul truck or its operation?
Choose any combination of a, b, c or choose d:
a. maintenance personnel
b. Operation & Maintenance Manuals (OMMs)
c. more experienced driver
d. immediate supervisor or other mine personnel
- 6.20 Have you familiarized yourself with (read/reviewed) the information in the OMM for your haul truck? **Yes / No**
- 6.21 Are OEM safety/warning labels present in readable form on the haul truck exterior and in the haul truck cab? **Yes / No / Don't Know**
- 6.22 During a shift, do you ever experience frequent or severe incidences of jarring or jolting (e.g., thrown against cab of truck/controls or whiplash) while operating the haul truck?
Yes / No
- 6.23 Have you received instruction on how to adjust the haul truck cab seats or read the instruction manual (OMM or seat manufacturer's guidelines) on the operation and adjustment of the seats? **Yes / No**
- 6.24 Do you adjust the seat in the haul truck cab before operating the haul truck? **Yes / No**
- If yes, proceed to 6.25
 - If no, proceed to 6.26
- 6.25 Have you experienced difficulties in adjusting haul truck cab seats? **Yes / No**
- 6.26 How often do you wear your seatbelt in your haul truck?
a. always
b. most of the time
c. some of the time
d. never

- 6.27 Does your seatbelt fit comfortably? **Yes / No**
- 6.28 Are there locations at the mine where drivers need to clean windows or clean and adjust mirrors frequently? **Yes / No**
- 6.29 Do you confirm that the haul truck bed has returned to its resting position before moving the haul truck? **Yes / No**
- 6.30 Do you experience difficulties using your radio communication system (e.g., static, excessive talking, noisy environment, other) when communicating with other vehicles or the dispatcher? **Yes / No**
- 6.31 Is your haul truck equipped with an operational video camera system? **Yes / No**
- If yes, proceed to 6.32
 - If no, proceed to 6.33
- 6.32 Do you use the video camera system for all of the following activities: backing to load, backing to dump, checking for hazards, and checking blind areas for other vehicles/workers?
Yes / No
- 6.33 Do you both: 1) utilize the provided fall protection while on the deck of the haul truck; and 2) only perform daily maintenance activities while on level, solid ground? **Yes / No**

Module 7: Loading

This module covers the loading process of the haul truck. This module will require you to observe a haul truck driver and the haul truck as it is being loaded. Additionally, you will need to directly question haul truck drivers. This module can be conducted in the field. Please have at least 5 haul truck drivers, or all drivers if you have less than 5 complete questions 7.6 through 7.11.

- 7.1 How is the haul truck driver informed when the haul truck is full and ready to move away?
- a. honk horn
 - b. radio contact
 - c. count loads
 - d. hand/visual signals (e.g., place loader bucket on ground)
 - e. other
- 7.2 Are procedures or practices (for example: two-way communication, flags on haul truck, or chains on bucket) in place to make the loader operator aware of truck type, size, and positioning prior to loading the haul truck and to prevent collisions between the truck and loading machine? **Yes / No**
- 7.3 Is the size of the material (e.g., rock, ore, or waste) considered during the loading process? **Yes / No**
- 7.4 Do the loading machine operators always attempt to evenly distribute the load in the haul truck bed to prevent unstable, uneven, or unequal distribution of rock in the bed? **Yes / No**
- 7.5 Are situations where the haul truck is overloaded (loading above the manufacturer's maximum acceptable gross machine weight level) identified? **Yes / No**

Questions for Haul Truck Drivers (ask at least 5 drivers or all drivers if less than 5)

- 7.6 Does unequal distribution or unstable loading of material in the bed of your haul truck ever occur? **Yes / No**
- 7.7 Are haul trucks ever overloaded (loaded above the manufacturer's maximum acceptable weight level)? **Yes / No**
- 7.8 Are procedures in place to address when haul truck overloading occurs? **Yes / No**
- 7.9 Are the driver, loader operator, dump site operator, foreman, and dispatch operator all notified if the truck is overloaded? **Yes / No**

- 7.10 Do you experience frequent jarring/jolting (e.g., thrown against cab of truck/controls or whiplash) in the cab of the truck during loading, especially during the first load of material?
Yes / No
- 7.11 Does spillage of material ever occur, from bed onto the truck cab or from the bed to the ground, during loading? **Yes / No**

Module 8: Dumping

This module covers the haul truck dumping process. This module will require you to observe a haul truck driver and the haul truck as it dumps its load. This module can be conducted in the field and requires a tape measure or other means to measure distance.

- 8.1 Is there a method that allows the driver to know if the truck bed has been raised beyond manufacturer's specifications? **Yes / No / Don't Know**
- 8.2 Do haul trucks have an audible or visible backup warning system? **Yes / No**
- 8.3 Which type of dumping is performed?
Choose all that apply:
- a. end dumping over an edge**
 - b. stockpile dumping**
 - c. dumping into a hopper or crusher**
- If a: complete questions 8.4 to 8.13
If b: complete questions 8.14 to 8.19
If c: complete questions 8.20 to 8.28

Questions for end dumping over an edge:

- 8.4 Observe (for at least 5 trucks) the geometry of the haul truck, from the side, while moving within the dump site area and when discharging the load. How does the haul truck dumping process compare with the illustrations of dumping practice shown in Figure 3?
- a. rear wheel higher than front wheels**
 - b. all wheels level**
 - c. front wheels higher than rear wheels**

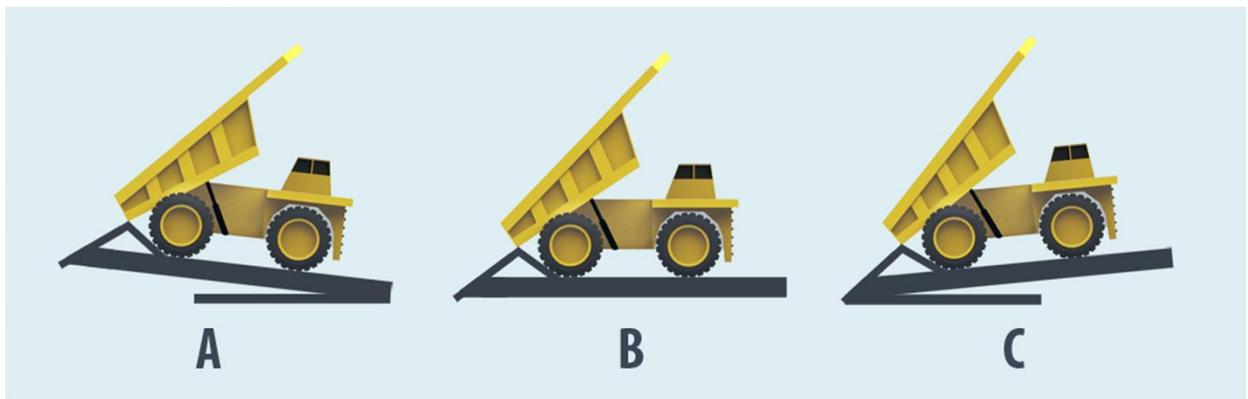


Figure 3. Haul truck diagrams displaying different dumping positions.

- 8.5 Observe the geometry of the haul truck, from the front while moving within the dump site area and when discharging the load. How does the haul truck dumping process compare with the illustrations of dumping practice shown in Figure 4?
- a. level ground from side to side
 - b. ground not level from side to side
 - c. soft ground

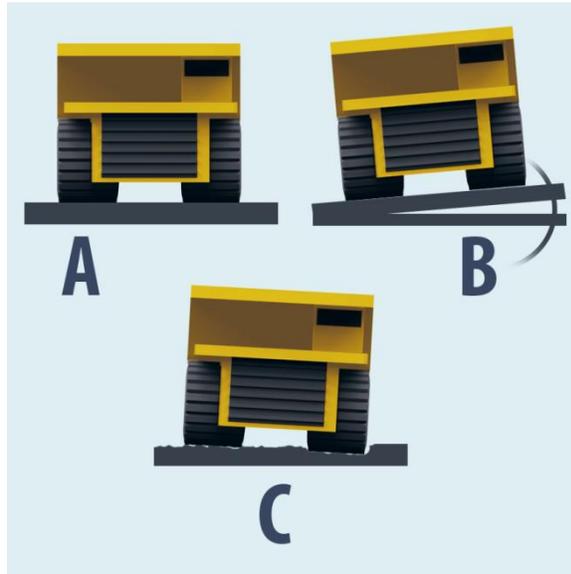


Figure 4. Haul truck diagrams (pictured from the front) displaying dumping practices.

- 8.6 How is the load discharged relative to the edge of the dump slope?
- a. end dumping over the edge
 - b. dumping short of the edge
 - c. other
 - If A, proceed to 8.7
 - If B or C, proceed to 8.8

- 8.7 Observe the geometry of the haul truck when backing up to discharge the load. How does this haul truck dumping task process compare with the illustration shown in Figure 5?
- a. passenger side rear tire reaching the berm before the driver's side rear tire
 - b. both rear tires of the truck reaching the berm at the same time
 - c. driver's side rear tire reaching the berm before the passenger side rear tire

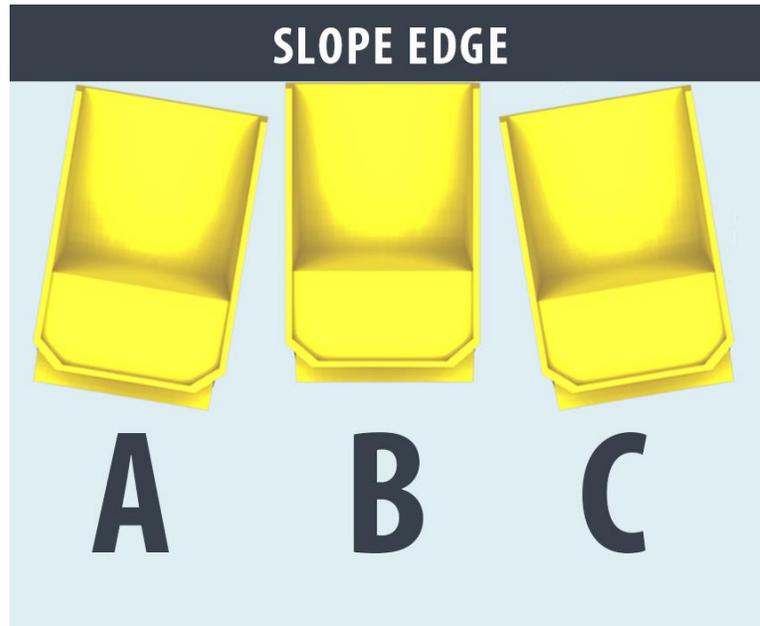


Figure 5. Haul truck dumping practices for approaching berm when end dumping.

8.8 During end dumping, are there times when a berm is observed to be less than the axle height of the largest piece of equipment that uses that dump, see Figure 6? **Yes / No**

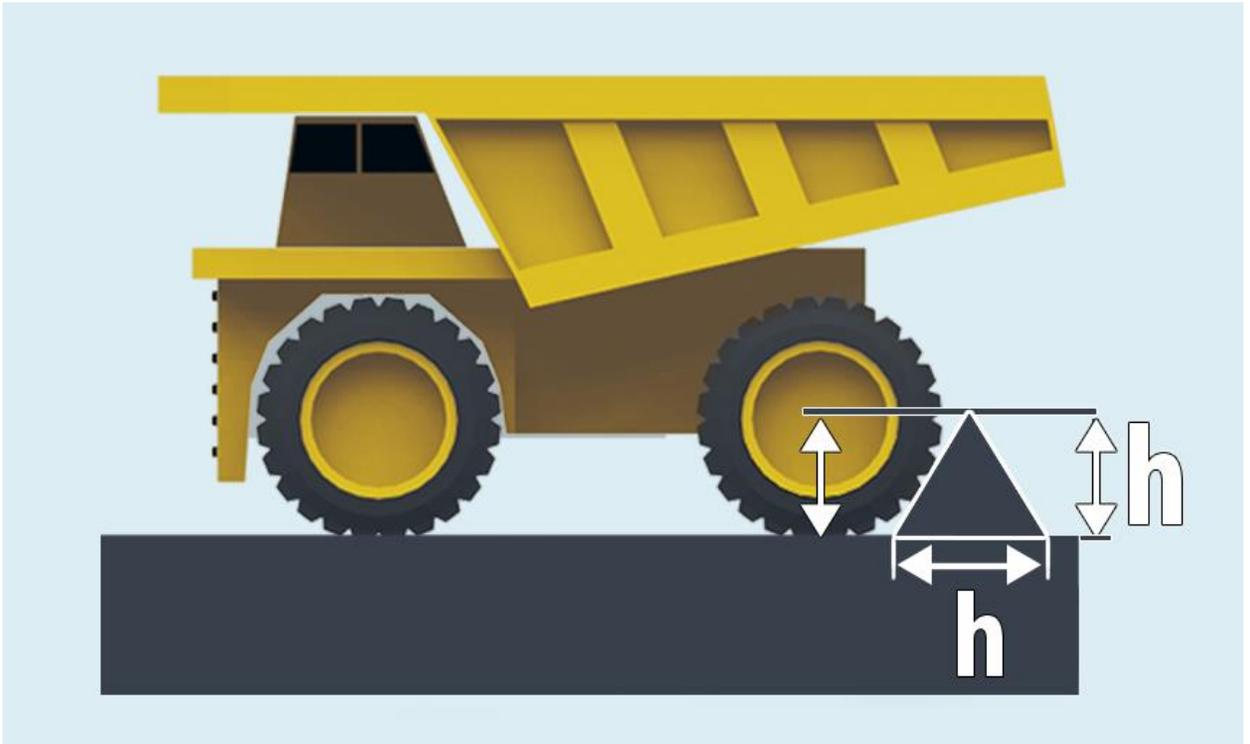


Figure 6. Haul truck preparing to discharge its load by end dumping. The term h is the recommended minimum height and width of the berm and is equivalent to the axle height of the largest piece of equipment that uses the dump site.

8.9 Is the dump area inspected for tension cracks, as shown in Figure 7? **Yes / No**

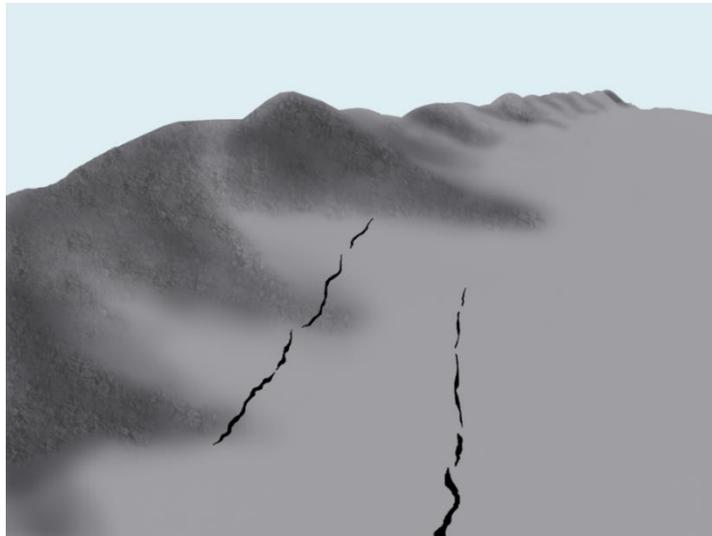


Figure 7. Tension cracks appearing in the dump area near the edge.

- 8.10 Are there times when the dump area is congested with other equipment? **Yes / No**
- 8.11 Does the dump area create difficulty for haul trucks when turning around (e.g., causing a driver to reverse more than once, or drive too close to the berm)? **Yes / No**
- 8.12 Is the dump area kept free of debris and spillage? **Yes / No**
- 8.13 Do you observe any ramps to the dump area that appear to be unsafe or unstable?
Yes / No

Questions for stockpile dumping:

- 8.14 Observe (at least 5 trucks) the geometry of the haul truck, from the side, while moving within the dump site area and when discharging the load. How does the haul truck dumping process compare with the illustrations of dumping practice shown in Figure 8?
- a. rear wheel higher than front wheels
 - b. all wheels level
 - c. front wheels higher than rear wheels

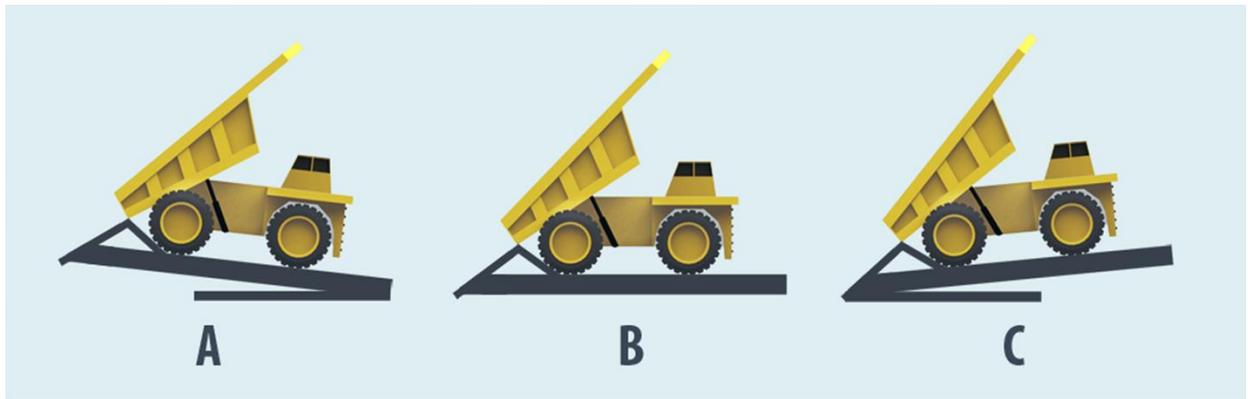


Figure 8. Haul truck diagrams displaying dumping practices.

- 8.15 Observe the geometry of the haul truck, from the front, while moving within the dump site area and when discharging the load. How does the haul truck dumping process compare with the illustrations of dumping practice shown in Figure 9?
- a. level ground from side to side
 - b. ground not level from side to side,
 - c. soft ground

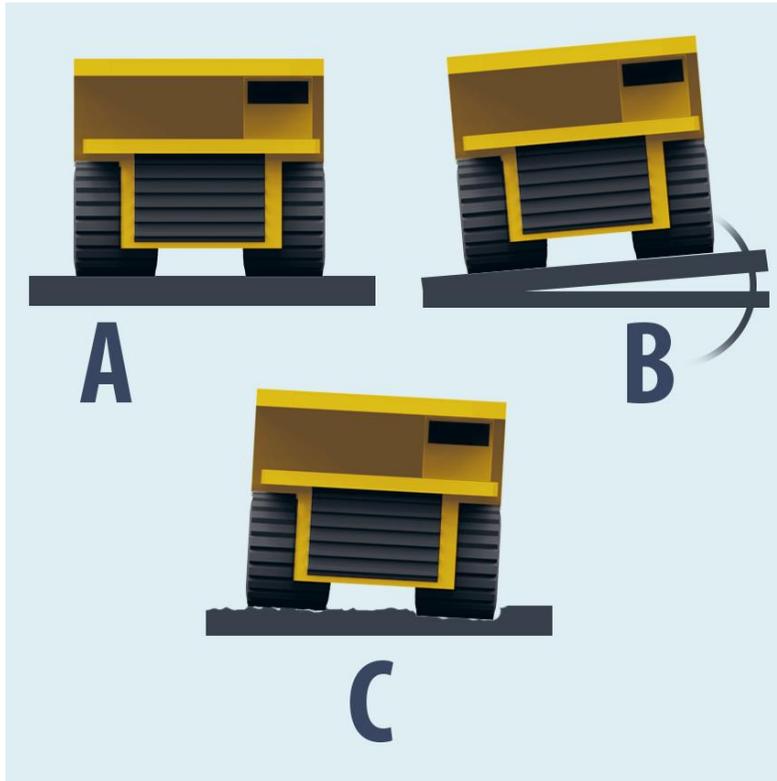


Figure 9. Haul truck diagrams displaying dumping practices.

- 8.16 Are there times when the dump area is congested with other equipment? **Yes / No**
- 8.17 Does the dump area create difficulty for haul trucks when turning around (e.g., causing a driver to reverse more than once, or drive too close to the berm)? **Yes / No**
- 8.18 Is the dump area kept free of debris and spillage? **Yes / No**
- 8.19 Do you observe any ramps to the dump area that appear to be unsafe or unstable? **Yes / No**

Questions for dumping into a hopper or crusher:

8.20 Are bumper blocks present at all hoppers where there is a hazard of overtravel or overturning a haul truck? **Yes / No**

8.21 Is the bumper block kept free of spillage (see Figures 10 and 11)? **Yes / No**



Figure 10. Excess spillage covering bumper block at the hopper/crusher.

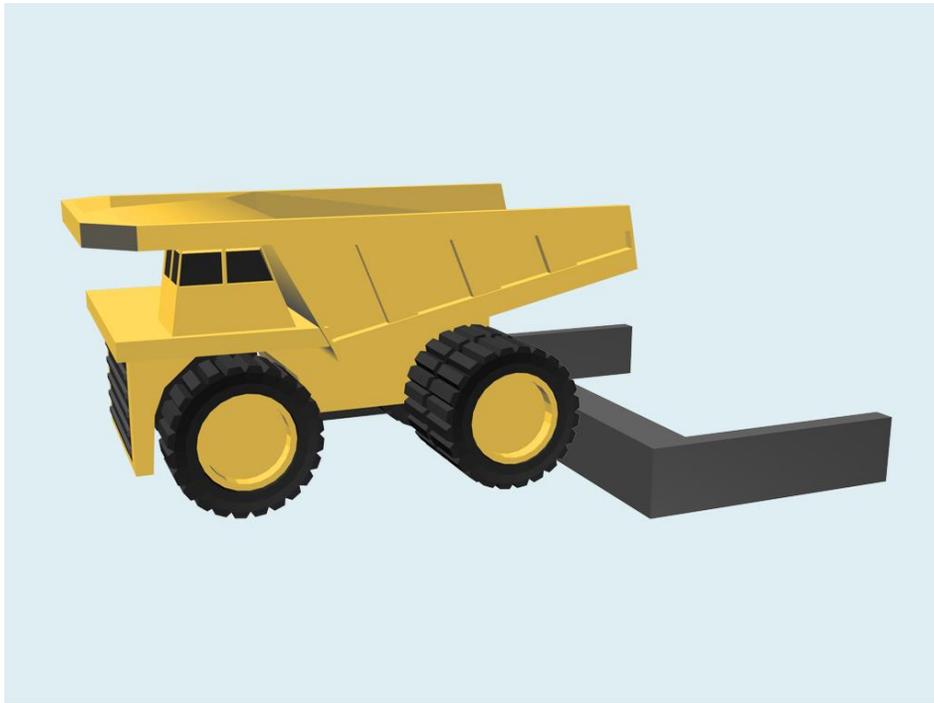


Figure 11. Bumper block with an exposed barrier and ready for dumping at hopper/crusher.

- 8.22 Is the edge of the bumper block free from excessive wear ensuring that a clean solid edge is provided? **Yes / No / Cannot observe bumper block**
- 8.23 Observe (at least 5 trucks) the geometry of the haul truck, from the side, while moving within the dump site area and when discharging the load. How does the haul truck dumping process compare with the illustrations of dumping practice shown in Figure 12? **a. rear wheel above front wheels**
b. all wheels level
c. front wheels above rear wheels

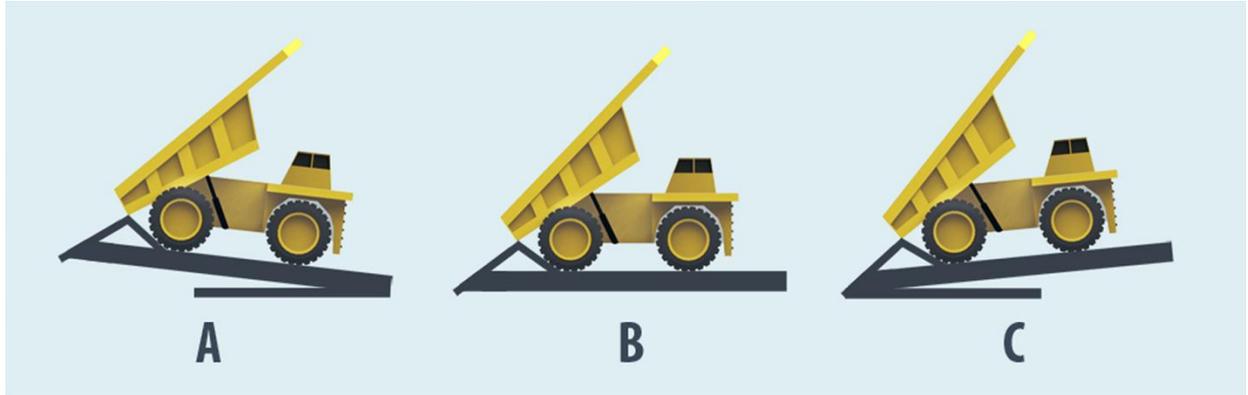


Figure 12. Haul truck diagrams displaying dumping practices.

- 8.24 Observe the geometry of the haul truck, from the front, while moving within the dump site area and when discharging the load. How does the haul truck dumping process compare with the illustrations of dumping practice shown in Figure 13?
- a. level ground from side to side
 - b. ground not level from side to side
 - c. soft ground

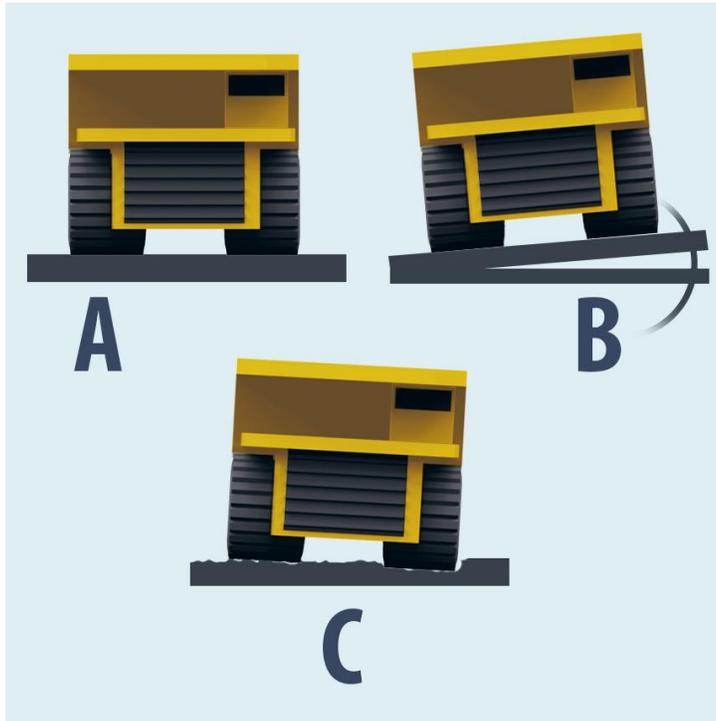


Figure 13. Haul truck diagrams displaying dumping practices.

- 8.25 Are there times when the dump area is congested with other equipment? **Yes / No**
- 8.26 Does the dump area create difficulty for haul trucks when turning around (e.g., causing a driver to reverse more than once, or drive too close to the berm)? **Yes / No**
- 8.27 Is the dump area kept free of debris and spillage? **Yes / No**
- 8.28 Do you observe any ramps to the dump area that appear to be unsafe or unstable?
Yes / No

Haul Truck Audit Recommendations

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Module 1: Training

- **(HT Q 1.1 if you did NOT answer A)** You indicated that haul truck driver task training is not delivered in a classroom. Consider adding classroom-based task training for all haul truck drivers. This allows drivers to become familiar with the Operation & Maintenance Manual (OMM) and all the truck functions in a low risk/low stress environment and ensures that the drivers have knowledge of all truck systems before driving the truck.
- **(HT Q 1.1 if you did NOT answer B)** You indicated that haul truck driver task training is not delivered on a truck. Consider adding truck-based task training for all haul truck drivers. This training should be conducted while the new driver operates the truck and the trainer rides along in the cab. This will allow the driver to ask questions during operation of the truck and gain a better understanding of the truck systems. This also allows for real-time assessment of the driver's proficiency with the truck before the driver operates the truck alone.
- **(HT Q 1.1 if you did NOT answer C)** You indicated that haul truck driver task training is not delivered in a simulator. If management and budgetary expectations permit, consider adding a simulator-based task training program for all haul truck drivers. The benefits of training in a simulator are that there is no risk of injury/damage from mistakes and no other drivers are taken off production to administer training. Simulator training is not a replacement for either classroom or on a real truck, but supplements these other training methods by allowing a driver to acquire more skills in a low-risk environment.
- **(HT Q 1.2 B)** You indicated that another driver delivers formal haul truck driving task training. While another driver will be able to go over truck systems and show the new driver how to use the truck, they may pass on bad habits or shortcuts to the new driver. It is preferable to have a mine-employed trainer conduct the task training. This is a person who was trained by the OEM on how to properly operate the truck and who is familiar with the mine site and mine policy. If current haul truck drivers are the preferred trainers, consider sending experienced drivers to training from the manufacturer to enhance their skills and ensure that they have all required knowledge and skills to effectively train new haul truck drivers.
- **(HT Q 1.2 C)** You indicated that an OEM trainer delivers formal haul truck driving task training. While the OEM trainer is familiar with the truck systems, they may not be familiar with the mine site or mine policy. It is preferable to have a mine-employed trainer or experienced haul truck driver conduct the training. This is a person who was trained by the OEM on how to properly operate the truck and who is familiar with the mine site and mine policy. If an OEM trainer is used, ensure that follow-up training is conducted that covers the specific mine site and mine policies.

- **(HT Q 1.2 D)** You indicated that a consultant trainer delivers formal haul truck driving task training. Although the consultant trainer is a qualified trainer, they may not be familiar with the specific truck systems, the mine site, or mine policy. It is preferable to have a mine-employed trainer or experienced haul truck driver conduct the training. This is a person who was trained by the OEM on how to properly operate the truck and who is familiar with the mine site and the mine policy. If a consultant trainer is used, ensure they are trained by the OEM on how to properly train for the equipment. Conduct follow-up task training that covers the specific mine site and mine policies if the consultant is not familiar with them.
- **(HT Q 1.3 if you did NOT answer A)** You indicated that pre-shift inspections are not covered in haul truck driver task training. It is important to properly train drivers on pre-shift inspection to ensure they understand the importance of this task and can properly identify defects with a truck system.
- **(HT Q 1.3 if you did NOT answer B)** You indicated that seatbelt usage is not covered in haul truck driver task training. It is essential to properly train drivers on the importance of wearing seatbelts and the effect seatbelts can have on their safety during an accident. [30 CFR § 56.14131(a), Seat belts for haulage trucks; 30 CFR § 77.403-1(g), Seatbelts required by...; 30 CFR § 77.1710.(i), Seatbelts in a vehicle...]. During this training, include discussing that drivers not try to leave or jump from the cab of the truck during an emergency situation and remain seated with seatbelt fastened to improve their chance of survival. A classic example is the scenario of a runaway truck caused by brake failure. See “Resources to Consider for Increasing Awareness and Use of Seatbelts on Mine Haul Trucks” section in this document.
- **(HT Q 1.3 if you did NOT answer C)** You indicated that jumping from the equipment is not covered in haul truck driver task training. It is important to discuss with the drivers the effect that jumping from a truck can have on their health and safety. Drivers should be told during training that the ground reaction forces (forces sustained by the body) are up to five times greater when jumping off equipment than when using the entire set of steps or ladder rungs. Drivers should be discouraged from jumping off the trucks at any level, as the resulting increased forces could lead to serious injuries such as broken bones, herniated discs in the back, and joint damage. During this training, include discussing that drivers not try to leave or jump from the cab of the truck during an emergency situation and remain seated with seatbelt fastened to improve their chance of survival. A classic example is the scenario of a runaway truck caused by brake failure.

- **(HT Q 1.3 if you did NOT answer D)** You indicated that proper usage of brake systems is not covered in haul truck driver task training. Training on the use of the braking systems is a critical topic to cover during driver training. Drivers have been injured or killed from misuse of braking systems on haul trucks. Drivers should be trained on when to use the engine retarder and each of the systems for specific areas of the mine sites and all grades present on the haul roads. Refer to the Operation & Maintenance Manual (OMM) for information for the model to be covered during training or contact the OEM for supplemental training materials. Driver task training should also include the testing of the different brakes systems on the haul trucks. Testing of the service brake system at the beginning of the shift or before starting down steep grades can identify problems in the braking system before full performance of the braking system is needed in a critical situation. It is also important to frequently check the grade holding ability of the parking brake. The OMM can be a source of information for determining the proper truck brake tests for various grades.
- **(HT Q 1.3 if you did NOT answer E)** You indicated that ingress/egress (3-point rule) is not covered in haul truck driver task training. Training on proper ingress/egress from a haul truck is important because many drivers are injured while climbing on or off the truck. MSHA strongly recommends the 3 points of contact rule, i.e., facing the truck and not carrying anything in the hands during ingress/egress. During training, define 3-point contact as “Two hands and one foot, or two feet and one hand.” Instruct workers to always maintain 3-point contact on the ingress/egress system when getting on or off the truck and to utilize a system, such as a backpack or rope and pulley, to transport materials on and off the truck.
- **(HT Q 1.3 if you did NOT answer F)** You indicated that road rules (e.g., speed, passing, driving side, minimum following distances) are not covered in haul truck driver task training. It is important to discuss the specific road rules of a mine site with drivers, including experienced drivers who come from other mine sites or companies. Drivers may endanger themselves or others on the mine site if they do not understand or follow the road rules such as speed limits, passing procedures, and driving side.
- **(HT Q 1.3 if you did NOT answer G)** You indicated that the Operation & Maintenance Manual (OMM) is not covered in haul truck driver task training. The OMM for each truck is a valuable source of information on proper use and function of truck systems. The employees should be shown the OMM, where it is kept, and what information is covered in the OMM. During training, drivers should be given time to review the OMM to become more familiar with the truck. OMMs should be provided in the cab of the truck so drivers can easily access them when needed.
- **(HT Q 1.3 if you did NOT answer H)** You indicated that haul truck specific hazards are not covered in haul truck driver task training. Haul truck specific hazards should be covered during all driver training. New drivers may not be aware of issues unique to haul trucks, such as stopping distance related to load/no-load conditions, and not realize the potential risk these issues pose while operating a haul truck.

- **(HT Q 1.3 if you did NOT answer I)** You indicated that explanation and identification of blind areas around the haul truck are not covered in haul truck driver task training. Haul trucks have reduced visibility and larger blind spots compared with other mobile equipment. It is important to review this subject with all drivers so that the drivers understand the importance of inspecting for blind spots and communicating with others near the haul truck before moving the haul truck. One way to present this topic is to have employees sit in a parked haul truck and map out blind spots with another person on the ground. This type of training should also be included for non-haul truck drivers who work near haul trucks. All employees should be aware of their reduced visibility when working near haul trucks.
- **(HT Q 1.3 if you did NOT answer J)** You indicated that the effects of weather on driving are not covered in haul truck driver task training. Drivers need to be aware of the effects of weather on driving and mine site conditions. Many environmental factors can seriously impact the safe operation of a haul truck. Haul roads can have differing properties on dry days compared to wet days and become very slick when wet. Snow may also impact the available traction or increase braking distances. Mine-specific issues should be discussed and ways to compensate for the effects of weather conditions should be covered during driver training.
- **(HT Q 1.3 if you did NOT answer K)** You indicated that seat adjustment in the haul truck cab is not covered in haul truck driver task training. Conduct training with all drivers on how to properly adjust the haul truck seats. Also, require that drivers review the Operation & Maintenance Manual (OMM) or seat manufacturer's instructions for adjusting driver and passenger seats; include this in future driver task training and refresher training.
- **(HT Q 1.4 A)** You indicated that only direct observations are used to ensure a drivers is properly trained to operate a haul truck. A written skills assessment of the haul truck driver can be beneficial to ensure the driver understands the purpose and function of all truck systems and functions before they operate the truck. This can reduce the risk of misuse of a truck system and potential for damage or injury from the misuse.
- **(HT Q 1.4 B)** You indicated that only a written quiz is used to ensure a driver is properly trained to operate a haul truck. An observer-based review of the haul truck driver's skills can be beneficial to ensure the driver understood the task training they have received and can translate that training to the routine daily operation of the haul truck.

- **(HT Q 1.4 D)** You indicated that another method which does not include both a quiz and an observational technique is used to ensure a driver is properly trained to operate a haul truck. It is important to assess a driver's competency to drive a haul truck before they are allowed to operate a truck independently. A combination of written skills assessment and an observer-based review of the haul truck driver's skills can be beneficial. These assessment techniques ensure that the driver understands the purpose and function of all truck systems before they operate the truck. Further, using these techniques can confirm that the driver understood the task training they received and can translate that training into the safe operation of a haul truck.

- **(HT Q 1.4 E)** You indicated that no method is in place to ensure a driver is properly trained to operate a haul truck. It is important to assess a driver's competency to drive a haul truck before they are allowed to operate a truck independently. A combination of written skills assessment and an observer-based review of the haul truck driver's skills can be beneficial. These assessment techniques ensure that the driver understands the purpose and function of all truck systems before they operate the truck. Further, using these techniques can confirm that the driver understood the task training they received and can translate that training into the safe operation of a haul truck.

Module 2: Policy

- **(HT Q 2.1 Yes)** You indicated that your site has a database of all safety incidents. Ensure that the database includes information in the example form provided and is reviewed by safety personnel at least monthly to identify trends and take corrective measures. To improve reporting, have an anonymous safety incident report form that drivers and other employees may place in a drop box. See “Safety Incident Report Form Topic List” section in this document for assistance in developing a site-specific form.
- **(HT Q 2.1 No)** You indicated that your site does not have a database of all safety incidents. Consider setting up a site-specific database of all safety incidents and near-miss accidents. This database should be reviewed at least monthly by safety personnel to identify trends and take corrective measures. The example Safety Incident Report Form Topic List provided can serve as a basis for compiling safety (near-miss) incident data and information. Management would need to develop a standardized form and drivers would be responsible for filling out and submitting the safety incident report form before the end of each shift. To improve reporting, have an anonymous safety incident report form that drivers and other employees may place in a drop box. See “Safety Incident Report Form Topic List” section in this document for assistance in developing a site-specific form.
- **(HT Q 2.2 No)** You indicated that a mechanic does not examine a haul truck after receiving a pre-shift inspection report which notes a mechanical issue. The mechanic should examine the truck according to items noted on the pre-shift inspection report and provide feedback to the maintenance supervisor and/or shift foreman as to whether the truck requires immediate repair and should be removed from service.
- **(HT Q 2.3 only when issues are found & Never)** You indicated that pre-shift inspection reports are not always reviewed by someone other than the driver before the truck is put into operation each shift. Pre-shift inspection reports with any issues of concern should always be reviewed by a shift foreman, a designated management official, or a mechanic prior to placing the truck into operation each shift.
- **(HT Q 2.4 No)** You indicated that the haul truck driver does not have the option to not drive a truck due to a safety concern which did not cause the truck to be out of service. All drivers should be given the option to not drive a truck if they have concerns that it is unsafe.
- **(HT Q 2.5 Yes)** You indicated that someone other than a mechanic has the authority to put a truck back into service. A mechanic should examine the haul truck to ensure all safety concerns raised by the driver on the pre-shift inspection report have been satisfactorily resolved and inform the shift foreman, maintenance supervisor, or designated management official before returning a truck back into service. The authority to put a truck back into service should only be held by the knowledgeable person responsible for making repairs to the truck.

- **(HT Q 2.6 No)** You indicated that haul truck drivers are not required to set the parking brake whenever parking the truck. Truck drivers must set the controls to the park position and utilize parking brakes when parking the truck per MSHA regulations [30 CFR § 56.14207].
- **(HT Q 2.7 No)** You indicated that haul truck drivers, in addition to using the parking brake, are not required to physically immobilize the truck when parking. Even in situations of little to no grade trucks have unexpectedly moved and injured others. Drivers should turn wheels into the berm when on a grade, park in a parking ditch or trough, park using a parking station that “locks” the truck into a stationary position (e.g., a berm or existing or created deep “rut or ditch”), or use wheel chocks. See Figure 14 for proper placement of wheel chocks.

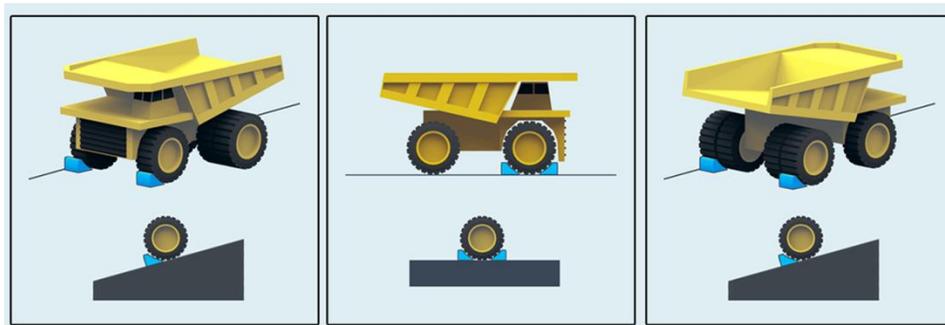


Figure 14. Diagram showing correct placement of a pair of wheel chocks for three different ground conditions.

- **(HT Q 2.8 No)** You indicated that haul truck drivers are not required to make their first move from a parked position in the forward direction (i.e., not backing up). Establish a “first move forward” policy that is included in drivers’ task training stating that the first movement of the haul truck is forward when moving from a stopped or parked position. Employees also should be trained to only cross on foot behind the rear of the truck when it is parked. Also, consider implementing a method such that drivers can communicate with surrounding vehicles and personnel before moving from a parked position (e.g., radio communication, use of headlights or horn).
- **(HT Q 2.9 No)** You indicated that haul truck drivers are not required to honk the horn before moving from a parked position. According to MSHA regulations, before moving a haul truck, the driver should sound a warning (e.g., horn honk) that is audible above the surrounding noise level and can be heard when wearing hearing protection [30 CFR § 56.14200 - Warnings prior to starting or moving equipment]. Instruct drivers to honk the horn, then wait an appropriate amount of time to ensure that any workers or equipment are in the clear before moving a truck from a parked position. This procedure ensures that drivers clearly communicate with surrounding vehicles and personnel before moving from a parked position and also gives surrounding vehicles and personnel a chance to move or communicate with the driver.

- **(HT Q 2.10 Yes)** You indicated that there is a policy for cell phone (personal and company provided) usage for haul truck drivers. You should: (1) Ensure that, at a minimum, the policy includes the stipulation that the cell phone should only be used when the truck is parked and not during operation, (2) Ensure that the policy is followed by establishing procedures for monitoring cell phone use and enforcement of the policy. (3) Establish appropriate disciplinary procedures for policy violators. Cell phone usage is addressed in [MSHA’s Best Practices from Tailgate Health Meeting Series](#).
- **(HT Q 2.10 No)** You indicated that there is not a policy for cell phone (personal and company provided) usage for haul truck drivers. You should:
 - 1) Develop a policy to limit use of cell phones (e.g., calling, text messaging, voicemail) to minimize distractions that increase the risk of creating hazardous conditions for the truck driver in performing assigned job duties and for other personnel in the working environment. The policy, at a minimum, should include the stipulation that the cell phone is only used when the truck is parked and not during operation.
 - 2) Ensure that the policy is followed by establishing procedures for monitoring cell phone use and enforcement of the policy.
 - 3) Establish appropriate disciplinary procedures for policy violators. Cell phone usage is addressed in [MSHA’s Best Practices from Tailgate Health Meeting Series](#).
- **(HT Q 2.11 Yes)** You indicated that drivers listen to music/radio while driving the haul truck. You should: (1) Develop a policy for listening to music/radio to minimize distractions that increase the risk of creating hazardous conditions for the truck driver in performing assigned job duties and for other personnel in the working environment. This should include having drivers monitor the volume of the music/radio so as not to interfere with dispatch or communication radios and instructing drivers not to use head phones while operating the equipment. (2) Ensure that this policy is followed with appropriate disciplinary procedures for policy violators.
- **(HT Q 2.12 B, or C)** You indicated that using seatbelts for all persons in the haul truck at all times is not your company’s policy. As specified in MSHA regulations [30 CFR § 56.14131(a), Seat belts for haulage trucks; 30 CFR § 77.403-1(g), Seatbelts required by...; 30 CFR § 77.1710(i), Seatbelts in a vehicle....] and other MSHA-produced information, truck drivers and passengers are required to always wear their seatbelts when inside a moving haul truck. Implement a seatbelt awareness and usage program to encourage increased usage of seatbelts. See “Resources to Consider for Increasing Awareness and Use of Seatbelts on Mine Haul Trucks” section in this document.
- **(HT Q 2.13 No)** You indicated that haul truck drivers are not permitted to request road grading or watering. Drivers and other vehicle/machinery operators should have the freedom to request road maintenance, including grading and watering. The shift foreman or designated management official must follow up on requested road maintenance to ensure that it is done promptly and effectively or communicate back to the driver why requested maintenance is not done.

- **(HT Q 2.14 No)** You indicated that alternative methods and equipment are not available for when the grader or water trucks are out of service. Establish back-up procedures and equipment to ensure that road maintenance is not delayed or postponed when the normally used equipment is unavailable. Ensure that backup equipment is properly maintained and pre-shift checks are conducted before this equipment is put into service.

- **(HT Q 2.15 if you did NOT answer A or C)** You indicated that OMMs for the haul trucks are not located in the cab of the truck and the shop. The Operation & Maintenance Manual (OMM) or relevant sections should be made available to truck drivers and all maintenance personnel. OMMs should be placed in every haul truck cab and shops where haul truck repair and maintenance occurs.

Module 3: Haul Road / Mine Pit

- **(HT Q 3.1 No)** You indicated that road rules (e.g., who has the right of way, passing acknowledgement, maintaining proper speed, traffic pattern, minimum following distances, driving side) are not clearly defined and communicated with all drivers. Road rules are important to protect all equipment operators. It is important that all drivers know and understand the road rules. These rules should be included in safety talks, site hazard training for visitors, and driver task training. Consider creating posters/signs that can be displayed in the office/break rooms with the road rules clearly defined to remind workers.
- **(HT Q 3.2 Yes)** You indicated that road rule infractions are tracked or documented. Use this information to identify areas of the mine, types of equipment, or types of operators (e.g., management, mobile equipment operators, and visitors) that routinely have road rule infractions. Also, use this information to revise training for improved communication with the offending group and the importance of following road rules. Consider discussing with mine personnel the reasons why road rules are not followed and address their concerns. Also, consider new signage if infractions are located at a specific area around the mine.
- **(HT Q 3.2 No)** You indicated that road rule infractions are not tracked or documented. Create a database to track and document road rule infractions. Ensure this documentation includes the area of the mine, type of equipment, and the type of operator (e.g., management, mobile equipment operators, and visitors). Use this information to identify areas of the mine, types of equipment, or types of operators that routinely involve road rule infractions. Also, use this information to revise training to better communicate with the offending group and to emphasize the importance of following road rules. Consider discussing with mine personnel the reasons why road rules are not followed and address their concerns. Moreover, consider new signage if infractions occur at a specific area around the mine.
- **(HT Q 3.3 Yes)** You indicated that employees report excessive dust clouds that reduce driver visibility on haul roads. Conduct a meeting with drivers, mine management, and road maintenance employees to discuss these issues. During this meeting, develop plans to address the current concerns and how to address future dust issues. These plans may include changes to watering/grading and/or adding additives to the water dispensed on the haul roads.
- **(HT Q 3.4 Yes)** You indicated that drivers report issues of overwatering of roads or dump areas. Conduct a meeting with drivers, mine management, and road maintenance employees to discuss these issues. During this meeting, develop plans to address the current concerns and how to address future overwatering. These plans may include changes to watering/grading plans or systems. If overwatering concerns exist, consider reducing the distribution of water applied to the haul roads (e.g., water every other 100 ft on grades).

- **(HT Q 3.5 No)** You indicated that signs (that clearly identify which vehicle has the right-of-way) are not present for all stop and yield locations. The orderly and predictable flow of traffic on mine property depends on all vehicle operators having a clear understanding of the traffic rules, especially the right-of-way practices used on the property. This can be achieved through driver task training and the effective use of signs.
 - Stop signs should be located as close as possible to the point where a vehicle is supposed to stop.
 - Use "STOP AHEAD" signs in cases of limited sight distances.
 - Stop signs can be supplemented with "4-WAY" or "ALL WAY" signs where multiway stops are required. Examples of places where stop signs might be used include: intersections of secondary roads and main haul roads, intersections where sight distance is limited, intersections of haul roads and public roads, and places where accidents have occurred in the past.
 - Yield signs should be located as close as possible to the point where vehicles are supposed to yield.
 - "YIELD AHEAD" signs should be placed in advance of the "YIELD" signs where necessary.
 - Yield and stop signs assign the right-of-way at road intersections. These signs should clearly identify who has the right of way at the intersection (e.g., "OPPOSING TRAFFIC HAS RIGHT-OF-WAY" or "TRAFFIC FROM LEFT HAS RIGHT-OF-WAY").

- **(HT Q 3.6 No)** You indicated that, as part of regular road inspections, signs are not inspected to ensure that they do not become blocked by vegetation or become illegible from dirt or deterioration. Mine management should review the adequacy of their signs regularly and ensure that signs do not become blocked by vegetation or become illegible from dirt or deterioration. As new mining areas are developed, additional signs may be needed. In evaluating the adequacy of signs, they should be considered from the viewpoint of a first-time visitor on the property, such as a sales person or a contractor.

- **(HT Q 3.7 No)** You indicated that areas where haul trucks share the road with other vehicles are not clearly identified by warning signs for the haul truck drivers. Special attention should be given to any areas where public roads intersect mine roads. Other drivers may not be familiar with the operation of mining equipment, the mine's traffic patterns, and equipment blind spots. Ensure that the traffic and warning signs that are provided in these areas are of sufficient size to be viewed and interpreted by haul truck drivers.

- **(HT Q 3.8 if you did NOT answer A)** You indicated that change in road condition/direction signs are not present on haul roads. Road condition/direction signs are important for safe and effective traffic control. A sign, such as "NARROW ROADWAY" warns drivers that the roadway ahead narrows and it may be difficult for two vehicles to pass each other. In addition, a sign indicating a change in roadway conditions lets drivers know about sharp rises or drops in the roadway surface that could create hazardous conditions or affect the safe handling of the vehicle.

- **(HT Q 3.8 if you did NOT answer B)** You indicated that signs that display grade, including recommended gear, are not present on haul roads. Signs that indicate grade and include a different gear requirement are important for haul truck driver safety and effective traffic control. A sign, such as a steep grade warning, provides drivers with advanced warning of steep downgrades where they need to exercise special caution. The percentage of grade, length of grade, and any special gearing requirements should be posted to better prepare the driver to descend the grade safely.
- **(HT Q 3.8 if you did NOT answer C)** You indicated that signs that display intersections are not present on haul roads. Signs that indicate intersections are important for haul truck driver safety and effective traffic control. A sign, such as “Intersection Ahead,” informs drivers in advance about obscured intersections or where crossing or turning traffic may not be immediately visible.
- **(HT Q 3.8 if you did NOT answer D)** You indicated that emergency signage is not present on haul roads. Signs that indicate emergency situations are important for haul truck driver safety and effective traffic control. A sign, such as “RUNAWAY TRUCK RAMP,” ensures that drivers know their location in case of an emergency.
- **(HT Q 3.8 if you did NOT answer E)** You indicated that signs that display traffic patterns are not present on haul roads. Nonstandard traffic patterns are found at some mines (e.g., driving on the left side of the road instead of the right). Equipment operators need to be aware of the traffic pattern used at the mine, where changes to the traffic pattern might occur, and the meaning of unfamiliar signs before traveling on mine property. Signs that indicate traffic patterns are important for haul truck driver safety and effective traffic control. A traffic pattern warning sign reminds the driver of the prevailing traffic pattern. An example of such a sign is “KEEP LEFT EXCEPT TO PASS”.

- **(HT Q 3.8 if you did NOT answer F)** You indicated that signs that display stop and yield locations and speed limits are not present on haul roads. Stop, yield, and speed limit signs are three essential regulatory signs required for haul truck driver safety and effective traffic control. Orderly and predictable flow of traffic on mine property depends on the vehicle operators' having a clear understanding of the traffic rules, especially the right-of-way practices used on the property. Stop signs should be located as close as possible to the point where a vehicle is supposed to stop. Use "STOP AHEAD" signs in cases of limited sight distances. Stop signs can be supplemented with "4-WAY" or "ALL WAY" signs where multiway stops are required. Examples of places where stop signs might be used include: intersections of secondary roads and main haul roads, intersections where sight distance is limited, intersections of haul roads and public roads, and places where accidents have occurred in the past. Similarly, yield signs need to be located as close as possible to the point where vehicles are supposed to yield. "YIELD AHEAD" signs should be placed in advance of the "YIELD" signs where necessary. Yield signs and stop signs assign the right-of-way at road intersections. These signs should clearly identify who has the right of way at the intersection (e.g., "OPPOSING TRAFFIC HAS RIGHT-OF-WAY" or "TRAFFIC FROM LEFT HAS RIGHT-OF-WAY"). Speed limits should be based on factors such as road conditions, grades, surface, visibility, curves, potential hazards, and the mechanical capabilities of the haulage equipment used at the mine. Speed limits should be posted at regular intervals to remind drivers of applicable speed limits. Also, speed limit signs should be posted near intersections where traffic may be entering onto the haul road from another road with a different speed limit.
- **(HT Q 3.8 if you did NOT answer G)** You indicated that signs that display no passing locations are not present on haul roads. A "NO PASSING" sign is another essential regulatory sign necessary for haul truck driver safety and effective traffic control. "NO PASSING" signs should be placed at the beginning of a restricted passing area. A "PASS WITH CARE" sign should also be present to indicate the end of the No Passing zone.
- **(HT Q 3.8 if you did NOT answer H)** You indicated that signs that display "DO NOT ENTER" are not present on haul roads. A "DO NOT ENTER" sign is another essential regulatory sign necessary for haul truck driver safety and effective traffic control. This sign should be placed at the end of a one-way road to keep traffic from entering the roadway and traveling in the wrong direction. "WRONG WAY" signs can supplement "DO NOT ENTER" signs.
- **(HT Q 3.8 if you did NOT answer I)** You indicated that signs that display one-way traffic are not present on haul roads. A "ONE WAY" sign is an important regulatory sign necessary for haul truck driver safety and effective traffic control. This sign should be placed at appropriate corners of intersections facing traffic entering or crossing the one-way road.

- **(HT Q 3.9 No)** You indicated that all the signs on the haul roads did not meet the listed recommendations. The mine operator is responsible for developing, installing, and maintaining signs on haul roads. Signs need to be posted wherever it's necessary to regulate, warn, direct, or inform traffic on haul roads and around mine property. The following important aspects should be included with the design, placement, and maintenance of mine haul road signs and for effective traffic control:
- Effective signs are understandable, legible, and visible to equipment operators, especially at night, and in both good and bad weather.
 - Where possible, sign format and design should follow standard public highway signs. Signs should be similar in regards to size, shape, color, and lettering throughout the mine site.
 - Signs should be positioned correctly with respect to the situation and be clearly visible and legible. When placing signs, the time it takes a driver to react to the sign and the mechanical characteristics (such as delay times and braking distances) of the vehicles used at the mine should be considered. Signs should be visible to all equipment operators.
 - Sign size, height, and lateral placement are important to ensure that signs are properly illuminated by vehicle headlights. The recommendation from research investigations stipulates a vertical height of 5 to 8 ft from the ground and a lateral offset of 6 to 12 ft from the edge of the road in most situations.
 - Where necessary, signs with a retroreflective surface should be used, especially if the mine/quarry operates at night or in poor weather conditions.
 - Signs should be maintained to ensure legibility and visibility. As necessary, signs should be cleaned to keep them visible.
 - Signs should be evaluated as needed to make sure they are correct for conditions.
- **(HT Q 3.10 No or don't know)** You indicated that road grades are not designed to accommodate the equipment with the least braking capability or you do not know how the road grades are designed. Regarding grade or steepness of a road, it is important to have compatibility between road conditions and equipment capability. A critical concern for haul truck safety is the ability of the brakes to function effectively on downgrades to avoid loss of control of the vehicle. Different equipment with differing performance characteristics will use the haul roads. Thus, roadway design must accommodate the equipment with the least, or the most critical, braking capability, which are usually large haul trucks.

- **(HT Q 3.11 No)** You indicated that speed limits do not vary with location, grade, and model of truck. Speed limits should be established based on the layout and condition of the roads and the capabilities of the equipment using the roads. Mine management should consider the following:
 - 1) In any area where sight distance is restricted, check to make sure that haul trucks traveling at the posted speed limit will be able to stop within the available sight distance.
 - 2) Verify whether the minimum following distances used on the mine/quarry property are appropriate for the speed limits and grades.
 - 3) For traveling downgrade, confirm that brake performance information for the haul trucks with selected speed limits are appropriate to avoid braking system malfunction or failure.
 - 4) Verify that the posted speed, when traveling around curves, is appropriate to allow for adequate traction.

- **(HT Q 3.12 No)** You indicated that speed limits are not posted on road signs. Traffic control signs, such as for speed limits, are important in providing the information, warning, and guidance that a driver needs to safely travel the mine/quarry property.

- **(HT Q 3.13 Yes)** You indicated that grades of greater than 10% are present. Grades over 10% are of special concern. The mine/quarry management should verify that all vehicles can safely travel existing grades and that brake system capabilities of haul trucks have been considered in establishing speed limits for downgrades, i.e., speed limits that allow the vehicle to function effectively within its braking capabilities. Because brake performance depends not only on the steepness of the grade but also on the vehicle's weight, it is important to ensure that trucks not be overloaded. Also, consider adding signs in the cabs (for each particular truck) that indicate the speeds that should not be exceeded when traveling various grades. These measures can be combined with placing signs along roadways to indicate the grade of steep portions of the haul road.

- **(HT Q 3.14 No)** You indicated that warning signs are not present on haul roads indicating the grade of areas with grades greater than 10%. Signs should be placed to indicate the grade of steep portions of the haul road. Moreover, mine/quarry management should verify that haul trucks can safely handle the grades. Also, signs could be added in the cabs indicating, for each particular truck, the speeds that should not be exceeded on various grades.

- **(HT Q 3.15 Yes)** You indicated that sharp curves are located near the top or bottom of a grade on haul roads. Mine/quarry operators should avoid designing haul roads that result in a sharp curve near the top of a grade. Such a curve is difficult to perceive at night, when headlights would tend to shine up into the darkness instead of along the roadway. If this situation cannot be avoided, measures should be taken to increase visibility of the curve, such as through the use of reflective markers on the edges of the road or added overhead lighting. Sharp curves should also be avoided near the bottom of a grade. Vehicles may pick up momentum towards the bottom of the grade and have difficulty maintaining control around the curve. If this situation cannot be avoided, a safe speed for descending the grade should be posted and adequate restraining measures, such as large berms or a runaway ramp, should be used to increase safety.

- **(HT Q 3.16 No)** You indicated that for one-way traffic haul roads, the haul roads are not at least 2 times the width of the widest vehicle using the road; or that for two-way traffic haul roads, the haul roads are not at least 3.5 times the width of the widest vehicle using the road. Haul roads should be designed with ample width to promote safe driving conditions. A narrow roadway will increase the risk of collision with other vehicles, may lead to other hazardous situations such as inadvertently contacting a berm or roadside ditch, and may present drivers with a more stressful driving environment. A good safety practice for mining equipment is that each lane of travel should provide clearance, on both sides, equal to one-half the width of the widest vehicle in use. For example, a haulage road should be at least 3.5 times the width of the widest vehicle using the road for two lanes of traffic. Consider a truck 18 ft wide, the road should be 63 ft wide for two-way traffic (i.e., $3.5 \times 18 \text{ ft} = 63 \text{ ft}$). Figure 15 shows the recommended roadway widths for equipment of different widths.

For a single-lane road, an additional roadway width of at least 4 ft should be provided to allow space for a vehicle to pull over if needed (e.g., if the vehicle breaks down). In situations where it is not possible to provide the full ideal road width, warning signs should be provided and slower speeds should be used.

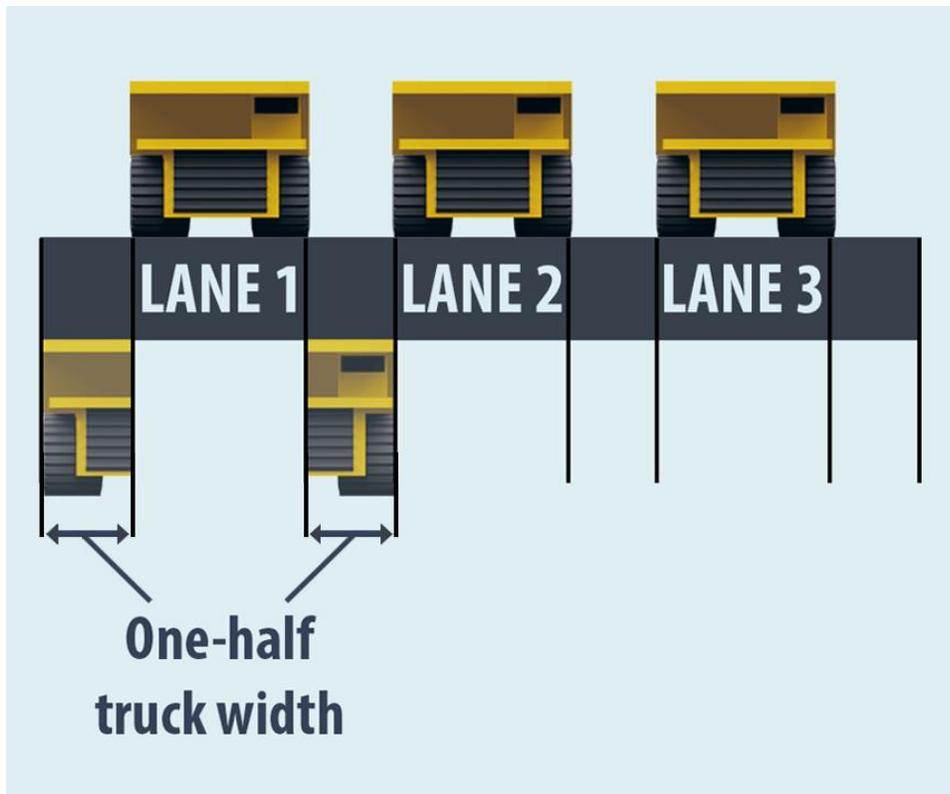


Figure 15. Diagram showing recommended one-way road widths for up to three lanes of traffic.

- **(HT Q 3.17 No)** You indicated that all berm heights are not at least as high and wide (at the base) as the axle height of the largest piece of equipment that uses the roadway. Berms must be at least as high as the axle height of the largest piece of equipment that uses the roadway. While the adequacy of a berm is generally judged based on its height, you should consider that the effectiveness of a berm also depends on its width, or thickness, and its firmness (see Haul Road Inspection Handbook¹, page 25). Where possible, larger berms should be used, especially in areas where vehicles may have more speed and in areas where there may be a greater chance of a vehicle going out of control, such as around curves or on steep grades.
- **(HT Q 3.18 Yes)** You indicated that berms are inspected (at least once a week) to ensure that they have not deteriorated. It is important to monitor berms regularly so they are maintained at axle-height or greater, of firm construction, and steeper-sided on the roadway side. Personnel who inspect berms should be aware of how well the berms are maintained, and whether erosion or sloughing of the slope, has undercut or otherwise made a berm inadequate. Roadway or dumpsite berms should be examined more frequently when a change in ground conditions occurs, such as freeze/thaw of roadways.
- **(HT Q 3.18 No)** You indicated that berms are not inspected (at least once a week) to ensure that they have not deteriorated. It is important to monitor berms regularly so they are maintained at axle height, of firm construction, and steeper-sided on the roadway side. Personnel who inspect berms should be aware of how well the berms are maintained, and whether erosion, or sloughing of the slope has undercut or otherwise made a berm inadequate. Roadway or dumpsite berms should be examined more frequently when a change in ground conditions occurs, such as freeze/thaw of roadways.
- **(HT Q 3.19 Yes)** You indicated that bench faces and/or stockpile slopes along haul roads are inspected for stability and to identify loose material at least once a week. Ensure the inspection process follows MSHA regulations for frequency of inspection as follows:
 - 1) “Highwalls, banks, benches, and terrain sloping into the working areas shall be examined after every rain, freeze, or thaw before persons work in such areas...;” and “Overhanging highwalls and banks be taken down and other unsafe ground conditions corrected promptly, or the area posted.” [30 CFR § 77.1004 (a and b), Ground control, inspection...].
 - 2) “Dumping locations shall be visually inspected prior to work commencing and as ground conditions warrant.” [30 CFR § 56.9304 (a), Unstable ground].

¹ MSHA Handbook Series: Haul Road Inspection Handbook PH99-I-4, June 1999.

- **(HT Q 3.19 No)** You indicated that bench faces and/or stockpile slopes along haul roads are not inspected for stability and to identify loose material at least once a week. Ensure that all bench faces or stockpile slopes are inspected and the inspection process follows MSHA regulations for frequency of inspection as follows:

“Highwalls, banks, benches, and terrain sloping into the working areas shall be examined after every rain, freeze, or thaw before persons work in such areas...;” and “Overhanging highwalls and banks be taken down and other unsafe ground conditions corrected promptly, or the area posted.” [30 CFR § 77.1004 (a and b), Ground control, inspection...]. “Dumping locations shall be visually inspected prior to work commencing and as ground conditions warrant.” [30 CFR § 56.9304 (a), Unstable ground].

- **(HT Q 3.20 No)** You indicated that adequate clearance (including height of bed when raised) from overhead power lines is not provided on all haul roads or you do not know if adequate clearance is provided. The presence of overhead power lines is a potential hazard that must be considered on all roads travelled by large vehicles such as haul trucks. Special attention should be paid to the presence of power lines around dump points where truck beds would be raised. In instances where haulage trucks pass under power lines, suspend the power lines high enough so that the minimum clearance is provided above the raised-bed height of the trucks used at the mine.

- **(HT Q 3.21 No)** You indicated that runaway truck provisions are not in place on all haul roads with a steep (greater than 5%) grade. Where roadways have steep grades, vehicles may go out of control while descending the grade. Escape ramps are an important way to intercept and control runaway trucks to prevent serious accidents. These ramps can bring a vehicle to a stop by some combination of these ways. They can:

- cause the vehicle to bog down in loose material;
- direct the vehicle onto a ramp that goes uphill;
- allow the vehicle to straddle a berm of loose material on the ramp (i.e., the safety center berm concept).

Guidance for building an appropriate escape ramp is provided in the Haul Road Inspection Handbook², pages 40–41.

² MSHA Handbook Series: Haul Road Inspection Handbook PH99-I-4, June 1999.

Module 4: Pre-Shift Inspection

- **(HT Q 4.1 No)** You indicated that there is not a standard form to document the pre-shift inspection of the haul truck. A standardized form that is specifically created for your mine site and equipment will allow for consistency and comprehensiveness of all inspections. A standardized form will also aid the person who reviews the information to identify concerns reported on the form.
- **(HT Q 4.2 No)** You indicated that training is not provided to cover all topics included on the pre-shift inspection form. Consider the following recommendations:
 - 1) As part of new driver task training and annual refresher training, drivers should be introduced to the pre-shift inspection form and the importance of completing an acceptable pre-shift inspection.
 - 2) Training on the pre-shift inspection process should be conducted by an OEM trainer or a person certified by the OEM to train on the equipment. This ensures that proper procedures and information for the specific make and model of the equipment are taught and any questions the drivers may have on the inspection procedures are addressed correctly and completely.
 - 3) During training on the pre-shift inspection process, drivers should be shown what constitutes a defect with each truck-specific system.
 - 4) Drivers need to be trained on how to utilize the pre-shift inspection form to report identified concerns and to know when a concern is serious enough to warrant removing the truck from service. As part of this training, discuss when and who will review the pre-shift inspection forms once they are completed by the driver.
 - 5) Drivers should be instructed to refer to the Operation & Maintenance Manual (OMM) or relevant sections of the OMM (e.g., a note card provided to the driver with information from the OMM) at any point during the pre-shift inspection or during their shift to assist in identifying defects with truck systems. This ensures proper information from the OEM is used in making determinations on truck systems.
 - 6) It is important to assess drivers' competence with the pre-shift inspection process during both new driver task training and, at least once a year, during annual refresher training for the time they remain haul truck drivers. This can be done through a written test or direct observation of the driver conducting the inspection. If drivers are not found competent, they should repeat the training. Furthermore, management should consider a directive that no drivers be permitted to operate a truck alone until they demonstrate an acceptable level of competence.
- **(HT Q 4.3 No)** You indicated that the training for pre-shift inspection is not conducted by an OEM trainer. Training on pre-shift inspection should be conducted by an OEM trainer or a person certified by the OEM to train on the equipment. This ensures that proper procedures and information for the specific make and model of the equipment are taught and that any questions the drivers may have on the inspection procedures are addressed correctly and completely.

- **(HT Q 4.4 No)** You indicated that the level of competence of a new haul truck driver is not assessed in follow-up to initial pre-shift inspection training. It is important to assess a driver's competence with the pre-shift inspection process. This can be done through a written test or direct observation of the driver conducting the inspection. If drivers are not found competent, they should repeat the training. Furthermore, management should consider a directive that no drivers be permitted to operate a truck alone until they demonstrate an acceptable level of competence.
- **(HT Q 4.5 No)** You indicated that follow-up assessments are not conducted to ensure that haul truck drivers are performing proper pre-shift inspections. It is important to conduct ongoing assessments of how properly a driver conducts a pre-shift inspection throughout a driver's time as a haul truck driver. This can be done through a written test or direct observation of the driver conducting the inspection. If drivers are not found competent, they should repeat the training. Furthermore, management should consider a directive that no drivers be permitted to operate a truck alone until they demonstrate an acceptable level of competence.
- **(HT Q 4.6 No)** You indicated that drivers are not instructed to refer to or use the Operation & Maintenance Manual (OMM) during the pre-shift inspection to assist in identifying defects with truck systems. Drivers should be instructed to refer to the OMM or parts thereof at any point during the pre-shift inspection or their operating shift to assist in identifying defects with truck systems. This ensures that proper information, identified in the OMM, is used to make determinations on truck systems.
- **(HT Q 4.7 No)** You indicated that the driver does not use any aids to supplement the pre-shift inspection forms. Consider developing an aid for the haul truck drivers that discusses what needs to be examined for each component of the inspection. This information may not be needed every day, but can be beneficial to all drivers as supplemental information and as a reminder of items to check. This aid can be developed using the Operation & Maintenance Manual (OMM) as a reference and can be in the form of note cards, a laminated sheet of paper, or other method suitable for your mine site. If different models or makes of haul trucks are used, a unique aid can be created for each.
- **(HT Q 4.8 No)** You indicated that each make and model of haul truck does not have a unique pre-shift inspection form designed specifically for that truck. A pre-shift inspection form should be unique for each type/class of equipment used (e.g., articulated vs. nonarticulated truck) and the specific mine environment (e.g., haul road layout and ground conditions). If different models or makes of haul trucks are used, a unique pre-shift inspection form should be created for each model or make. If your mining company has more than one location, a unique pre-shift inspection form should be created for each location. This ensures that the pre-shift inspection form includes the specific components of the truck, issues with your mine site (e.g., haul road layout or ground conditions), and items that need to be examined according to the Operation & Maintenance Manual (OMM). Systems such as brakes and suspensions vary between manufacturers and models. Consequently, the ways in which these systems must be inspected and issues identified are different and also unique for each system. As such, these differences should be reflected on your pre-shift inspection forms.

- **(HT Q 4.9 No)** You indicated that the pre-shift inspection form did not contain all the listed topics. Revise the pre-shift inspection form to include all the topics listed below that apply to the specific truck being inspected and for your specific mine site.

Examine on the machine:

- safe access to cab
- fluid levels
- engine compartment
- hoses, lines, tubes, and fittings for damage
- drive belts and guards
- electrical system

Examine in the cab:

- mirrors and windows
- wipers
- horn
- seatbelt
- lights and turn signals
- two way radio and computer
- camera
- backup devices
- emergency steering
- indicators with test switch
- cab environment
- fire extinguisher
- all controls in neutral
- heat, air conditioning, and defroster
- instrument operation
- brakes
- retarder function
- monitoring system

Examine on the ground:

- ground condition
- identification of equipment and personnel around the parked truck
- slip/trip hazards
- truck is secured against movement
- general condition of truck
- leaks
- suspension system damage
- driveshaft
- steering linkage
- tires and wheels
- physical condition of external parking brake
- physical condition and cleanliness of lights
- fire extinguisher and fire suppression system
- radiator for debris and damage
- unusual odors and noises
- excess heat
- air-tank relief valve

- **(HT Q 4.10 No)** You indicated that a pair of wheel chocks are not used or are not in the correct location before conducting an inspection. Refer to Figure 16 and ensure that all drivers have a pair of wheel chocks in proper placement before all inspections. Retrain all workers on the importance of chocking the truck, especially during a pre-shift inspection, as they will be underneath the truck with little to no time to escape if the truck starts to move.

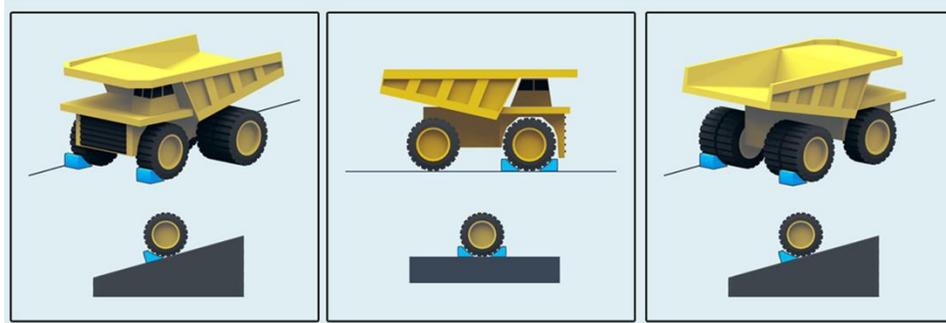


Figure 16. Diagram showing correct placement of a pair of wheel chocks for three different ground conditions.

- **(HT Q 4.11 No)** You indicated that the haul truck driver does not communicate with the driver from the previous shift about the mining operations and condition/operation of the haul truck. Important information should be shared between drivers from shift to shift. Issues such as minor malfunctions in the truck systems, which do not warrant removal of the truck from service, areas to watch on the haul roads or mine pits, and items the outgoing shift driver noted on their pre-shift inspection should be shared. This will ensure that the driver is able to operate the truck as safely as possible.
- **(HT Q 4.12 No)** You indicated that drivers are not instructed to remove the key from the ignition of the truck and to check that the parking brake is engaged before performing the pre-shift inspection. Removing the key from the ignition of the truck ensures that the truck is not started by someone else or moved while the driver is conducting a pre-shift inspection. While performing the pre-shift inspection, the driver will be underneath the truck with little to no time to escape or signal if the truck starts to move. Additionally, having the driver check that the parking brake is engaged and wheels chocked will ensure that the truck is unable to move during the inspection.
- **(HT Q 4.13 No)** You indicated that the engine compartment is not visually examined for flammable materials and fluids before starting the engine. It is important to have the driver examine the engine compartment visually for flammable materials and fluids before starting the engine. If flammable liquids are present in the engine compartment and the engine is started, the truck may catch fire and injure the driver and/or others in the area.

- **(HT Q 4.14 No)** You indicated that the horn is not sounded before starting the engine. According to MSHA regulations, the driver should sound a warning (e.g., horn honk) before starting a haul truck that is audible above the surrounding noise level and can be heard when wearing hearing protection [30 CFR § 56.14200, Warnings prior to starting or moving equipment]. The horn or other warning signal should always be used before starting the engine. This warns all others around the truck that the engine is starting and to stay clear of the truck. It is important to have a different signal for engine starting and for alerting surrounding personnel that the vehicle is about to move (e.g., one honk for starting the engine and two honks for moving forward).
- **(HT Q 4.15 No)** You indicated that the signal used to signal the start of the engine is not different from the signal to alert surrounding personnel that the vehicle is about to move. It is important to have a different signal for engine starting and for alerting surrounding personnel that the vehicle is about to move (e.g., one honk for starting the engine and two honks for moving forward).
- **(HT Q 4.16 No)** You indicated that further checks of the truck are not performed after starting the engine. After the engine is started, it is a good practice for the driver to check the truck again for issues that may not be identified when the engine is not running. For example, the driver should: check for leaks of air, oil, and fuel; ensure the functionality of brakes, steering system, lights, gauges; and check for any unusual noises or smells. It is important during this checking process that drivers stay clear of any areas where they could be injured by a running engine (e.g., engine compartment).
- **(HT Q 4.18 No)** You indicated that tools, materials, or equipment used to conduct the pre-shift inspection are not stored on the truck in a location near the ladder/steps and accessible at ground level. MSHA has recommended creating a "[Bad weather box](#)." This is a box located near the ladder/steps and accessible from the ground. This box should include all tools, materials, or equipment required for the driver to conduct the ground portion of the pre-shift inspection. This will prevent the need for drivers to carry items up or down the ladder/steps access system, which may prevent them from maintaining 3-points of contact. Ideally, such a box would be located both near the ground and in the cab, thereby ensuring that all materials are available at both locations.
- **(HT Q 4.19 No)** You indicated that drivers feel that they are not provided with adequate time to perform a comprehensive pre-shift inspection. Discuss with management and all foremen the importance of allowing drivers adequate time to conduct a comprehensive pre-shift inspection. Have the mine management/foremen discuss with their drivers that the driver should take as long as they need to complete a comprehensive pre-shift inspection. Consider instituting a policy which requires management/foremen to account for the time needed to perform an adequate pre-shift inspection in each driver's shift.

Module 5: Ingress/Egress

- **(HT Q 5.1 B)** You indicated that the primary ingress/egress system on the haul truck was damaged. To ensure the safety of the workers, promptly replace any damaged parts on the primary ingress/egress system of the haul truck.
- **(HT Q 5.1 C)** You indicated that the primary ingress/egress system on the haul truck was unusable. To ensure the safety of the workers, remove the truck from service until the primary ingress/egress system is repaired/replaced.
- **(HT Q 5.2 B)** You indicated that the secondary/emergency ingress/egress system on the haul truck was damaged. To ensure the safety of the workers, promptly replace any damaged parts on the secondary/emergency ingress/egress system of the haul truck.
- **(HT Q 5.2 C)** You indicated that the secondary/emergency ingress/egress system on the haul truck was unusable. To ensure the safety of the workers, remove the truck from service until the secondary/emergency ingress/egress system is repaired/replaced.
- **(HT Q 5.3 No)** You indicated that the first step of the haul truck was not a hydraulic step. Consider replacing the first step with a hydraulic/telescoping step to reduce the height of the first step.
- **(HT Q 5.4 Yes)** You indicated that wet contaminants (e.g., oil, grease, mud, or puddles) were present on the handrails, steps of the ingress/egress system, or the deck of the truck. To ensure the safety of the workers, have the haul truck cleaned and add the tasks of cleaning the handrails, steps of the ingress/egress system, and the deck of all haul trucks to daily maintenance or refueling of the vehicle.
- **(HT Q 5.5 No)** You indicated that the steps/rungs/deck of the truck were not made of a nonslip design or coated in a nonslip material. Worn or slippery surfaces on which the operator must walk should be replaced with a slip-resistant design or surface.
- **(HT Q 5.6 No)** You indicated that sufficient handrails and steps/rungs are not provided to enable 3-points of contact while getting on or off the truck. Contact the OEM or retrofit the equipment to ensure all necessary handholds and footholds are present to ensure drivers are able to maintain 3-points of contact while getting on or off the truck.
- **(HT Q 5.7 Yes)** You indicated that drivers jump from the ladder or platforms to the ground when getting off the truck. The ground reaction forces (forces to which the body is exposed) are up to five times greater when jumping off equipment than when using the entire set of steps, thereby increasing risk of injury. Establish mine policy to discourage drivers from jumping off their trucks from any height level.

- **(HT Q 5.8 No)** You indicated that the exterior of the haul trucks are not cleaned at least weekly. Add to routine maintenance tasks the regular (at least once a week) cleaning of haul trucks. During cleaning, pay special attention to ingress/egress systems, windows, lights, and signage. These systems directly influence operator safety. A sign which is not readable due to dirt may cause drivers to miss-identify hazards.
- **(HT Q 5.9 No)** You indicated that the trucks' ingress/egress systems and decks are not inspected for any loose or overly worn bolts or structural components at least once a month. Have a mechanic inspect these systems regularly (at least once a month) and replace any worn parts as soon as they are identified.
- **(HT Q 5.10 No)** You indicated that drivers do not use 3-points of contact to get on and off the equipment and do not exit the truck facing the equipment. To reduce the risk of falls, train and enforce the use of 3-point contact and exiting truck while facing equipment. During task training, define 3-point contact as "Two hands and one foot, or two feet and one hand."
- **(HT Q 5.11 Yes)** You indicated that the drivers carry something in their hands while getting on or off the truck. Carrying items while getting on/off the truck can increase the risk of falls. Consider providing a head-mounted flashlight and a backpack to eliminate the need to carry items in hands while getting on and off the truck. Also, consider adding a method to transport material on and off the truck (e.g., rope suspended from the handrail of the cab deck for lifting a lunch box).
- **(HT Q 5.12 No)** You indicated that drivers are not instructed to park vehicles only in an uncongested area with solid ground. Require drivers to park haul trucks in an uncongested area with solid ground to allow them to safely perform future activities, such as pre-shift inspections and getting on or off the truck. Consider developing and establishing safe parking locations for haul trucks that are located in areas with solid ground and little congestion from other vehicles.

- **(HT Q 5.13 No)** You indicated that parking locations do not decrease the height of the first step. Redesign parking locations of haul trucks to reduce the height of the first step. For example, create a trench in which the front tires would rest to help lower the front of the truck; see Figure 17. This would decrease the distance from the ground to the bottom step and also prevent further truck movement while in a parked location.

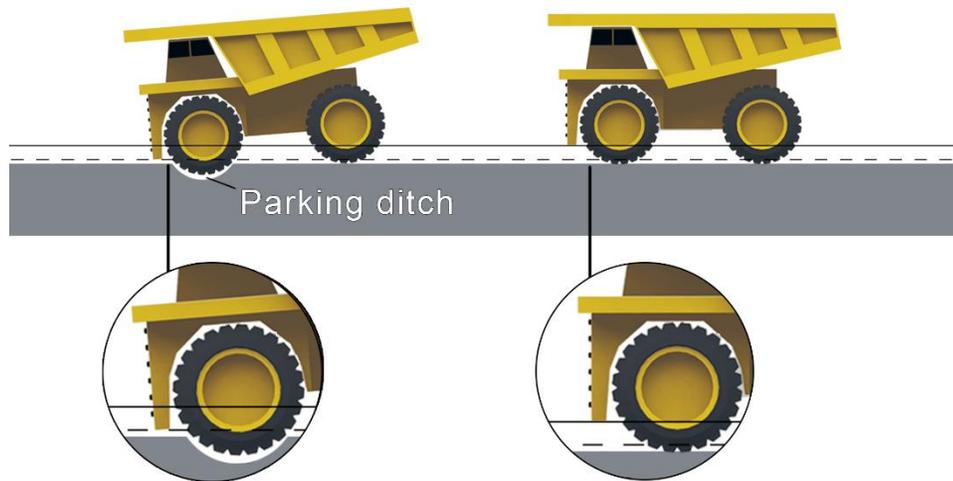


Figure 17. Difference in height of the first step with and without the parking ditch.

- **(HT Q 5.14 No)** You indicated that parking docks are not used to allow drivers to walk off trucks onto a rigid platform instead of using truck ingress/egress systems. Consider adding parking docks to established/permanent parking locations to aid drivers in getting on and off the truck.

Module 6: Driving / Cab Layout

- **(HT Q 6.1 No)** You indicated that a copy of the Operation & Maintenance Manual (OMM) is not present in the haul truck. The OMM or relevant sections should be made available to truck drivers and all maintenance personnel. OMMs should be placed in every haul truck cab and shop where haul truck maintenance is performed.
- **(HT Q 6.2 No)** You indicated that areas of hazards such as low clearance, first-step risks, pinch points, and fall risks were not labeled in the haul truck cab or on the haul truck exterior. Promptly add appropriate labels where necessary. Contact the OEM for replacement or additional labels or order appropriate labels from other sources.
- **(HT Q 6.3 No)** You indicated that the speed limits are not posted on the dash of the haul truck. Add decals or labels to the dash of all haul trucks that identify speed limits for the specific truck makes and models, different grades of the haul roads, and mine-/quarry-specific information. These labels should be updated as mine roads and conditions change.
- **(HT Q 6.4 No)** You indicated that drivers were not able to reach and use the non-OEM controls without bending their torsos. When placing non-OEM equipment in the cab of the truck, consider the location of the controls with respect to the driver. All equipment/controls should be positioned or repositioned such that the controls are within the driver's normal reach envelope (can be reached while sitting and reaching the arms without bending or twisting the torso) when possible. Consider using articulated arms to mount equipment such that the controls can be adjusted to be in each driver's reach envelope and field of view without obstructing their view of the road and surrounding areas while driving.
- **(HT Q 6.5 No)** You indicated that the driver's seat does not include an adjustment for all of the following: backward/forward direction, up/down, pre-load weight of the driver, seat pan tilt, backrest tilt, headrest with up/down adjustment, lumbar support with adjustment, and variable damping suspension. Include these stated seat adjustments when existing haul truck seats are replaced with new seats. Proper seat adjustment is important so that each driver can vary comfort and attenuating characteristics of the seat to adopt good posture while sitting. Good driver posture occurs when the feet comfortably reach the floor and the hips and knees are at the same level. It is also important that headrest, backrest, lumbar support, and suspension conform to the way the driver uses the workstation so the body is supported and fatigue is reduced.
- **(HT Q 6.6 No)** You indicated that seatbelts are not in good working condition or are not available for both the driver and passenger seat in the haul truck cab. Any haul truck without functional seat belts for both driver and passenger should be taken out of service immediately and seat belts added, replaced, or repaired.

- **(HT Q 6.7 No)** You indicated that the seatbelts, as specified by the date recorded on the manufacturer's label, are outside the designated useful life period. Any haul truck with expired seatbelts should be taken out of service immediately and the seatbelts replaced.
- **(HT Q 6.8 No)** You indicated that pins or other mechanisms are not stored on the truck to allow for immobilization of moving parts before a driver/mechanic needs to enter pinch points or under the bed of the truck. Add pins or other mechanisms to all haul trucks which allow a driver/mechanic to immobilize moving parts before coming into contact with them. The pins should be placed at or by the location where they are to be used to allow for easy access and serve as a reminder to drivers.
- **(HT Q 6.9 if you did NOT answer A)** You indicated that paper towels/rags are not provided in the cab of the truck. It is important that drivers have all necessary items stored in the cab of the truck so they can avoid climbing off the truck to get them. Paper towels/rags can be used in many ways to help clean the truck. If these items are not present, a driver may choose not to perform cleaning activities and, thereby, increase the risk from potential hazards.
- **(HT Q 6.9 if you did NOT answer B)** You indicated that window washing supplies are not provided in the cab of the truck. It is important that drivers have all necessary supplies stored in the cab of the truck so they can avoid climbing off the truck to get them. Window cleaning supplies are used to remove dust, dirt, and debris from the windows of the truck to improve visibility. If these supplies are not present, a driver may choose not to perform cleaning the activities and increase the risk from potential hazards.
- **(HT Q 6.9 if you did NOT answer C)** You indicated that tools are not provided in the cab of the truck. It is important that drivers have all necessary tools stored in the cab of truck so they can avoid climbing off the truck to get a tool. Appropriate tools, such as wrenches and screwdrivers, may be necessary to make minor adjustments inside the cab during the shift. Drivers should have access to common hand tools so they are not discouraged from making minor adjustments or encouraged to make an adjustment with improper tools.
- **(HT Q 6.9 D)** You indicated that no tools are provided in the cab of the truck. It is important that drivers have all necessary tools stored in the cab of the truck so that they can avoid climbing off the truck to get a tool. Paper towels/rags can be used in many ways to help clean the truck. Window cleaning supplies are used to remove dust, dirt, and debris from the windows of the truck to improve visibility. If these items and supplies are not present, a driver may choose not to perform cleaning activities and increase the risk from potential hazards. Appropriate tools such as wrenches and screwdrivers may be necessary to make minor adjustments inside the cab during the shift. Drivers should have access to common hand tools so they are not discouraged from making minor adjustments or encouraged to make adjustment using improper tools.

- **(HT Q 6.10 No)** You indicated that fueling and/or lubing points are located above the drivers' shoulder level. Reaching above shoulder height can increase the risk of injury to the arms and shoulders. Add access platforms or step stools to areas where fueling/lubing occurs and encourage drivers to use these systems while fueling or lubing the haul trucks.

- **(HT Q 6.11 No)** You indicated that cabs of the haul truck are not monitored for dust and noise exposure with and without the windows open. Cabs of the haul trucks should be included in dust and noise monitoring programs. Testing should occur when the windows are closed as well as when they are open. If drivers operate with open windows and high levels of dust or noise are found, take action to ensure that levels are maintained within the limits specified by 30 CFR § 71.208 of the MSHA standards.

- **(HT Q 6.12 No)** You indicated that the dust/noise levels in the cab of the truck are not in compliance with MSHA standards. Take action to ensure that levels are maintained within limits specified by MSHA standards. For example, in haul trucks where dust is a concern, request that maintenance personnel perform the following actions:
 - 1) Evaluate and inspect dust filtration system
 - 2) Inspect cab structure periodically
 - 3) Check haul truck cab door and window seals and replace worn and/or deteriorated gasket material
 - 4) Ensure that outside air inlet is positioned away from dust source
 - 5) Ensure discharge vents are located above the operator
 - 6) Ensure recirculation inlets are located near floor
 - 7) Ensure positive cab air pressure is maintained
 - 8) Seal cracks and holes in cab

- **(HT Q 6.13 Yes)** You indicated that drivers have complained of incidents of jarring or jolting while operating haul trucks or that you have had MSHA-reportable injuries due to jarring or jolting. Find out from drivers where in the mine/quarry the jarring/jolting occurred and what activity they were performing at the time of occurrence. If drivers are subject to long-term vibration exposure, they may develop health issues such as back and neck pain.
 - 1) If jarring/jolting is caused by rough roadway surfaces, communicate with grader operator to improve road surface by eliminating ruts and potholes.
 - 2) If jarring/jolting occurs during the loading process, communicate with loader/shovel/excavator operator to adjust or modify loading technique to exercise care in dropping the first load of large/heavy material into an empty haul truck bed, to avoid spillage, and to avoid striking the haul truck with the shovel or loader bucket.
 - 3) If jarring/jolting occurs during the dumping process, communicate with the dozer operator at the dump site to smooth the dump surface for haul truck traffic.
 - 4) Measurement of vibration exposure levels by the mine safety department or outside consultant will allow mine management to assess driver safety and health risk relative to recommended international and U.S. national standards. Consider evaluating driver vibration exposures using an appropriate monitoring device (human vibration meter, e.g., Larson-Davis Model HVM100) to compare measured haul truck driver exposures with recommended levels (ISO 2631-1:1997, ANSI S3.18:2002, EU Guide to Good Practice on Whole-body Vibration: 2006). In addition to driver feedback, measurements can be used to evaluate the effectiveness of any remedial actions (actions 1 through 3 listed here) to determine the effectiveness of remedial actions. If high levels of vibration are being transmitted to the driver through the seat, the seat should be evaluated and repaired or replaced.

- **(HT Q 6.14 No)** You indicated that the trucks are not physically immobilized by externally applied pins before repair or inspection work is performed in a potential pinch point around the truck. Many fatalities have occurred when all components of trucks were not immobilized prior to maintenance. Consult the Operation & Maintenance Manual (OMM) for areas of potential pinch point hazards (e.g., pivot point on an articulated haul truck or underneath the raised bed of truck). Ensure that pins or other restraint mechanisms are used when performing all inspection/maintenance work done within zones around the truck that denote potential pinch-point hazards. If signage is missing on the haul truck, contact the OEM for replacement signage [30 CFR § 77.405, Performing Work from a Raised Position, Safeguards; 30 CFR § 56.14211, Blocking Equipment in a Raised Position].

- **(HT Q 6.15 No)** You indicated that tires/wheel rims are not checked at least weekly for air pressure, tread wear, cracking in the sidewall, and damage to the rim. Require that all tires/wheel rims are checked for any issues. If issues with the tires are identified, remove the truck from service until the tires/wheel rims can be repaired/replaced. Add weekly inspection of the tires/wheel rims to scheduled maintenance procedures for all haul trucks. Train employees on how to spot signs of damage.

- **(HT Q 6.16 B or C)** You indicated that barriers (such as handrails) as a form of fall protection were not present on the haul truck. Ensure barrier fall protection is available on the deck of the truck as much as possible. Consult with OEM for ways to add barriers when appropriate.
- **(HT Q 6.16 A or C)** You indicated that roping off the ingress/egress system is not performed as a form of fall protection on the haul truck. Ensure ropes and attachment points are provided at all open areas on the deck of the truck. Consult with the OEM for ways to add barriers where appropriate. [30 CFR § 56.15005, Safety belts and lines; 30 CFR §77.1710(g), Safety belts and lines...].
- **(HT Q 6.16 A or B)** You indicated that tie-offs and lanyards as a form of fall protection were not provided on the haul truck. Ensure that tie-off locations are clearly marked and lanyards and harnesses are provided to all drivers where a risk of falling exists and no other form of fall protection can be provided. Consult with the OEM for ways to add tie-offs where appropriate. [30 CFR § 56.15005, Safety belts and lines; 30 CFR §77.1710(g), Safety belts and lines...].
- **(HT Q 6.16 D)** You indicated that no form of fall protection was provided on the haul truck. Ensure that barriers (e.g., roping, tie-off, and lanyards) are provided to all drivers where a risk of falling exists. Consult with OEM for ways to add fall protection where appropriate. [30 CFR § 56.15005, Safety belts and lines; 30 CFR §77.1710(g), Safety belts and lines...].
- **(HT Q 6.17 No)** You indicated that no ingress/egress systems are available around the fueling station. Consider adding access systems or other modifications to the fueling station that allow for easy access to any required controls.
- **(HT Q 6.18 No)** You indicated that fueling stations are not properly illuminated to allow for safe operations (e.g., visibility of nozzle, fuel port on truck, gauges, ground conditions) around the haul trucks for all times when fueling may occur. Add lighting to the fueling stations when possible to increase illumination. If it is not possible to add lighting to the facility, consider adding lighting to the truck and/or provide headlamps for the drivers to use during fueling activities. These lamps could also be located in a storage box at the fueling station for use as needed.
- **(HT Q 6.19 if you did NOT answer A or D)** You indicated that drivers do not go to maintenance personnel when they need information about or help with their haul truck or its operation. Encourage drivers to consult with maintenance personnel on issues with their haul trucks to identify areas of the truck that may need repair. For example, a driver should seek the help of maintenance personnel for malfunctions in truck systems, such as defective components for adjusting the seat or seatbelt warning indicator in the dashboard control display.
- **(HT Q 6.19 if you did NOT answer B or D)** You indicated that drivers do not refer to the Operation & Maintenance Manual (OMM) when they need information about or help with their haul truck or its operation. Encourage drivers to consult with the OMM for proper use and function of truck systems. For example, a driver should seek help from an OMM for information such as proper use of braking systems or specifications for fluid levels.

- **(HT Q 6.19 if you did NOT answer C or D)** You indicated that drivers do not go to more experienced drivers when they need information about or help with their haul truck or its operation. Encourage drivers to consult with more experienced drivers in understanding information within the Operation & Maintenance Manual (OMM) and proper truck functions. For example, a driver should seek help from an experienced driver for information on how to properly operate the haul truck at the specific mine site (e.g., best gear for certain haul road grades). Additionally, experienced drivers can provide assistance for common issues that are experienced while driving a haul truck—for instance, why a haul truck will not move in reverse (dump lever not in proper position) or how to handle a situation of overloading. Additionally, routinely bring OEM personnel in to retrain drivers and provide assistance as needed.
- **(HT Q 6.19 D)** You indicated that drivers go to their immediate supervisor or other mine personnel when they need information about or help with their haul truck or its operation. Encourage drivers to consult with maintenance personnel on issues with the haul trucks to identify areas where the truck may need repair. Encourage drivers to consult the OMM for proper use and function of truck systems. Encourage drivers to consult with more experienced driver on issues with understanding the OMM and proper truck functions. Ensure that only proper procedures and techniques are shared between drivers as more experienced drivers may pass on bad habits or shortcuts that could endanger other workers. Additionally, routinely bring OEM personnel in to retrain drivers and provide assistance as needed.
- **(HT Q 6.20 No)** You indicated that the drivers have not familiarized themselves with the information in the Operation & Maintenance Manual (OMM). Encourage drivers to review the OMM of the equipment that they operate and provide them with time to review OMM during task training and annual refresher training or whenever requested by the employee.
- **(HT Q 6.21 No or Don't Know)** You indicated that the driver reported that OEM safety/warning labels were not present in readable form on the haul truck exterior and in the haul truck cab. Refer to the Operation & Maintenance Manual (OMM) for correct OEM labels and locations. Contact the OEM for proper labels and install/replace promptly.
- **(HT Q 6.21 Don't Know)** You indicated that the driver didn't know if OEM safety/warning labels were present in readable form on the haul truck exterior and in the haul truck cab. Refer to the Operation & Maintenance Manual (OMM) for correct OEM labels and locations. Ensure all labels are present in readable form. Contact the OEM for proper labels and install/replace promptly.
- **(HT Q 6.22 Yes)** You indicated that during a shift the drivers experience frequent or severe incidences of jarring or jolting while operating the haul truck. Create a system to have drivers report events of jarring/jolting to mine management and ask them to identify their activities and location of these events.

- **(HT Q 6.23 No)** You indicated that the drivers reported that they have not received instructions on how to adjust the haul truck cab seats or read the instruction manual (Operation & Maintenance Manual (OMM) or seat manufacturer’s guidelines) on the operation and adjustment of the seats. Conduct training with all drivers on how to properly adjust the haul truck seats. Also, require that drivers review the OMM or seat manufacturer’s instructions for adjusting driver/passenger seats and include in future driver task training/refreshers training.
- **(HT Q 6.24 No)** You indicated that the drivers do not adjust the seat in the haul truck cab before operating the haul truck. Instruct drivers to adjust the seat prior to each shift and re-adjust as needed throughout the shift. Drivers should adjust seat for comfort, visibility, and ability to operate controls in cab.
- **(HT Q 6.25 Yes)** You indicated that the drivers have experienced difficulties in adjusting haul truck cab seats. Have drivers that experience difficulties adjusting their truck seats to consult experienced drivers or maintenance personnel familiar with the specific haul truck. Additionally, require that drivers review Operation & Maintenance Manual (OMM) or seat manufacturer’s guidelines for instructions on adjusting haul truck cab seats.
- **(HT Q 6.26 B or C or D)** You indicated that the drivers do not always wear their seatbelts. If not already mine/quarry policy, establish this as policy to ensure drivers of all mobile equipment always wear their seatbelts. [30 CFR § 56.14131(a), Seat belts for haulage trucks; 30 CFR § 77.403-1(g), Seatbelts required by...; 30 CFR § 77.1710(i), Seatbelts in a vehicle...]. Consider implementing a seatbelt awareness and usage program to encourage increased usage of seatbelts. See the “Resources to Consider for Increasing Awareness and Use of Seatbelts on Mine Haul Trucks” section in this document.
- **(HT Q 6.27 No)** You indicated that the drivers feel their seatbelts do not fit comfortably. Instruct drivers to check the Operation & Maintenance Manual (OMM) or seat manufacturer’s instructions for proper seatbelt adjustment and/or to consult experienced driver and/or maintenance department for information to improve comfort. Educate drivers to understand that the seatbelt may be uncomfortable but is safe so long as it doesn’t restrict motion and visibility when driving. If the driver feels the seatbelt interferes with safe driving, consider replacing the seat belt/seat.
- **(HT Q 6.28 Yes)** You indicated that the drivers report specific areas where window and mirror cleaning and adjustments seem to frequently occur. Work with the drivers to identify locations and circumstances where accumulations occur more readily on windows and mirrors and determine appropriate actions to remedy the issue. If the accumulation cannot be prevented, implement a wash station to allow cleaning of the windshield mirrors without the need for the driver to exit the cab.

- **(HT Q 6.29 No)** You indicated that drivers do not confirm that the haul truck bed has returned to its resting position before moving the haul truck. Encourage drivers to verify haul truck bed has returned to resting position before moving the haul truck. Consider adding feedback mechanisms to aid the driver such as visual indicators or combination audio/visual indicators. This will reduce the risk of a raised bed hitting an object with low clearance.
- **(HT Q 6.30 Yes)** You indicated that the drivers experience difficulties while using their radio communication system when communicating with other vehicles/dispatcher. You should: (1) Repair/replace defective communication system or components; (2) consider a driving rule to limit excessive chatter by employees; (3) ensure that drivers have windows closed and that door seals are in good condition; (4) ensure that all drivers are properly trained on how to use the radio.
- **(HT Q 6.32 No)** You indicated that the drivers do not use the video system on the haul truck for all of the following activities: backing up to load, backing up to dump, checking for hazards, and checking blind areas for other vehicles/workers. Encourage drivers to check video displays before moving the vehicle (backing up to load, backing up to dump, checking for hazards, checking blind areas for other vehicles/workers). Ensure that camera lenses are kept clean—free from dirt, debris, and obstructions.
- **(HT Q 6.33 No)** You indicated that the drivers do not utilize the fall protection provided while on the deck of the haul truck and/or do not perform daily maintenance activities while on level, solid ground [30 CFR § 56.15005, Safety belts and lines; 30 CFR §77.1710(g), Safety belts and lines....]. Instruct drivers to use all fall protection provided and to only perform daily maintenance activities while on level, solid ground. Talk with drivers to find out why they do not use fall protection and discuss various ways to encourage them to do so. Talk with drivers to determine why they do not perform daily maintenance activities while on level, solid ground and discuss various ways to encourage them to do so or provide solid level areas for these activities. Consider retraining all employees and discuss the MSHA regulations and potential for citations for fall protection violations.

Module 7: Loading

- **(HT Q 7.1 A)** You indicated the loader operator uses a horn honk to signal the haul truck driver when the truck is full and ready to move away. Horn honking is not an ideal form of communication as it may not include feedback or confirmation and may lead to misunderstandings between operators. Direct communication such as radio contact or hand/visual signals with feedback and confirmation assures an appropriate level of communication between the driver and the loading machine operator. Ensure that communications between the driver and loading machine operator are clear, consistent, and followed.
- **(HT Q 7.1 B)** You indicated that haul truck drivers are informed by radio contact when the haul truck is full and ready to move away. Direct communication such as radio contact or hand/visual signals with feedback and confirmation assures an appropriate level of communication between the driver and the loading machine operator. Communications from the loading machine operator should include that the haul truck is fully loaded and it is now clear for the truck to carefully depart the loading area. Before departing, the haul truck driver should signal to the loading machine operator that the message was received. Ensure that communications between the driver and loading machine operator are clear, consistent, and followed.
- **(HT Q 7.1 C)** You indicated that haul truck drivers are informed by counting bucket loads completed as to when the haul truck is full and ready to move away. Counting of loads or other methods may not be reliable and may cause the driver to prematurely pull away from the loader and could potentially lead to a collision between the truck and the bucket. Direct communication such as radio contact or hand/visual signals with feedback and confirmation assures an appropriate level of communication between the driver and the loading machine operator. Ensure that communications between the driver and loading machine operator are clear, consistent, and followed.
- **(HT Q 7.1 D)** You indicated that haul truck drivers are informed by hand/visual signals when the haul truck is full and ready to move away. Direct communication such as radio contact or hand/visual signals with feedback and confirmation assures an appropriate level of communication between the driver and the loading machine operator. Communications from the loading machine operator should include that the haul truck is fully loaded and it is now clear for the truck to carefully depart the loading area. Before departing, the haul truck driver should signal to the loading machine operator that the message was received. Ensure that communications between the driver and loading machine operator are clear, consistent, and followed.

- **(HT Q 7.1 E)** You indicated that the haul truck driver is informed by an unidentified method when the haul truck is full and ready to move away. Direct communication such as radio contact or hand/visual signals with feedback assures an appropriate level of communication between the driver and the loading machine operator. Communications from the loading machine operator should include that the haul truck is fully loaded and it is now clear for the truck to carefully depart the loading area. Before departing, the haul truck driver should signal to the loading machine operator that the message was received. Horn honking may not include feedback from both and may lead to misunderstandings between operators. Counting of loads or other methods may not be reliable and may cause the driver to prematurely pull away from the loader and could potentially lead to a collision between the truck and the bucket. Ensure that communications between the driver and the loading machine operator are clear, consistent, and followed.

- **(HT Q 7.2 No)** You indicated that no procedures or practices are in place to make the loader operator aware of truck positioning prior to loading the haul truck and to prevent collisions between the truck and the loading machine. Consider establishing a clear and reliable procedure with agreement from both haul truck driver and loading machine operator to avoid and minimize the risk of a collision. Some example procedures include:
 - 1) Two-way communication between the haul truck driver and the loader operator upon entry of the haul truck into the loading area and before the loader operator makes the first move toward the truck.
 - 2) Adding loose-fitting chains to the underside of the loader machine bucket. The sound of the chains hitting the bed of the truck alerts the loader operator that the haul truck bed is near and reduces the risk of the bucket striking the bed of the haul truck.
 - 3) Adding flags to the bed of the haul truck to increase visibility.

- **(HT Q 7.3 No)** You indicated that the size of material is not considered in the loading process. The size of material should vary when loading the haul truck to reduce the risk of jarring or jolting the truck driver. If possible, the first load of material should contain smaller-size pieces to cushion the subsequent loads. Consider reviewing and revising the blasting plan design in order to minimize the extent to which overly large pieces of material are produced during the blasting process. To avoid the occurrence of unstable truck loads, reinforce through task training how loading machine operators can properly fill and evenly distribute material in the beds of haul trucks.

- **(HT Q 7.4 No)** You indicated that the loading machine operator does not attempt to evenly distribute the load in the haul truck bed to prevent unstable, uneven, or unequal distribution of material. Consider establishing mine policies and procedures based on haul truck OEM guidelines for correct load placement and distribution in the haul truck bed. Loads should be centered and not shifted toward the front, rear, or either side of the truck bed. Instruct the loading machine operator to check the haul truck before it moves away to ensure the load is evenly distributed and to reduce the risk of the load shifting. To avoid the occurrence of unstable truck loads, reinforce through task training how loading machine operators can properly fill and evenly distribute material in the beds of haul trucks.

- **(HT Q 7.5 No)** You indicated that overloading of the haul truck is not identified. Ideally, overloading should be identified by a system integrated into the haul truck which alerts the haul truck driver by a visual display or audio signal within the cab. If this is not possible, an overloaded condition should be identified by the loading machine operator to prevent future occurrences. Institute a policy based on haul truck OEM guidelines that can be verified and will accurately and reliably show when the maximum acceptable gross machine weight has been reached or exceeded. For example, the Caterpillar Inc. recommended practice may be stated as: “No more than 10 percent of loads should exceed 110 percent of the target load (load intended for placement in truck) and no load should ever exceed the maximum allowable load – 120 percent of the target load.” With this information or information from your truck manufacturer, create a policy that prohibits any truck from leaving the loading area with a load greater than 120% of the target load and requires the driver to document when a load is greater than 110% of the target load.

- **(HT Q 7.6 Yes)** You indicated that unequal distribution or unstable loading of material in the bed of the haul trucks occurs. Consider establishing mine policies and procedures based upon haul truck OEM guidelines for correct load placement and distribution in the haul truck bed. Loads should be centered and not shifted toward the front, rear, or either side of the truck bed. Instruct the loading machine operator to check the haul truck before it moves away to ensure the load is evenly distributed and to reduce the risk of the load shifting. To avoid the occurrence of unstable truck loads, reinforce through task training how loading machine operators can properly fill and evenly distribute material in the beds of haul trucks. Consider reviewing and revising the blasting plan design in order to minimize the extent to which overly large pieces of material are produced during the blasting process.

- **(HT Q 7.7 Yes)** You indicated that drivers report haul trucks are overloaded. Overloading should be avoided whenever possible. Solicit feedback from drivers to determine location and causes of overloading. Set each truck’s safe maximum acceptable weight level based on specifications of OEM. Institute a policy based on haul truck OEM guidelines that can be verified and will accurately and reliably show when the maximum acceptable gross machine weight has been reached or exceeded. For example, the Caterpillar Inc. recommended practice may be stated as: “No more than 10 percent of loads should exceed 110 percent of the target load (load intended for placement in truck) and no load should ever exceed the maximum allowable load – 120 percent of the target load.” With this information or information from your truck manufacturer, create a policy that prohibits any truck from leaving the loading area with a load greater than 120% of the target load and requires the driver to document when a load is greater than 110% of the target load.

- **(HT Q 7.8 No)** You indicated that the driver was unaware of any procedures that specifically address haul truck overloading. Develop safe procedures for reducing the amount of loaded material to within acceptable limits at the loading location and prohibit overloaded trucks from leaving the loading area until the truck's load is reduced to acceptable levels. Review the guidelines of the haul truck OEM for recommended procedures to prevent and resolve overloading of trucks. Some possible ways to address an overloaded truck are to remove material from the truck before leaving the loading area or dump at a special location in the loading area; then have the truck reloaded.
- **(HT Q 7.9 Yes)** You indicated that the drivers report that the haul truck driver, loader operator, dump site, foreman, and dispatch are not notified if the truck is overloaded. If a truck has been overloaded, the driver, loader operator, and foreman should be notified to handle the situation effectively and safely. The haul truck should not be allowed to leave the loading area while overloaded. Instead, the driver should dump a portion of their load and be reloaded as needed while remaining in the loading area. Location and occurrence of overloading issues should be reported to the foreman, dispatch, and/or mine management to allow for identification of trends and remediation. This information should then be used to identify the root causes of overloading and help develop preventative measures to reduce future occurrences.
- **(HT Q 7.10 Yes)** You indicated that the driver reports experiencing frequent jarring/jolting in the cab of the truck during loading. Encourage haul truck drivers to communicate with the loading machine operator or supervisor if they experience excessive jarring/jolting. Additionally, ensure that the loading machine operator exercises care in dropping the first load into the haul truck bed. Consider depositing a first load which contains smaller-size material to cushion subsequent loads of larger, heavier pieces of material. Also, examine the seat to ensure it is capable of effectively attenuating vibration due to mechanical shock (jarring/jolting). A properly designed seat, while not the main source of managing vibration, can help reduce driver exposure to jarring/jolting by attenuating vibration transmitted from the truck chassis or frame to the driver.
- **(HT Q 7.11 Yes)** You indicated that the drivers report that spillage of material occurs during loading. Spillage of material from the bed onto the cab may lead to injuries to the driver and equipment damage. Spillage from the bed onto the ground may lead to damage to the truck/tires and may produce uneven ground leading to increased jarring/jolting of the equipment operators. Encourage haul truck drivers to communicate with the loading machine operator or supervisor if excessive spillage is an issue. Additionally, reinforce effective loading techniques and spillage prevention during annual refresher and task training.

Module 8: Dumping

- **(HT Q 8.1 No or Don't Know)** You indicated that either there is not or that you did not know if there was a method that allows the driver to know if the truck bed has been raised beyond the manufacturer's specifications. Raising the bed too high may lead to the truck becoming unstable and tipping over. If not already available, consult with the OEM or mine maintenance to install a sensor with a visible or audible signal to prevent raising the haul truck bed too high.
- **(HT Q 8.2 No)** You indicated that haul trucks do not have an audible or visible backup warning system. According to MSHA regulations, the driver should sound a warning (e.g., horn honk) before beginning to back up a haul truck that is audible above the surrounding noise level and can be heard when wearing hearing protection [30 CFR § 56.14200, Warnings prior to starting or moving equipment].
- **(HT Q 8.4 B)** You indicated that the wheels of the truck are level when observed from the side while moving in the dump area and discharging the load. Safety during dumping can be improved with a slight upward slope that puts the rear wheels at a higher elevation than the front wheels. This shifts the center of gravity slightly forward and reduces the risk of the truck tipping over backwards during unloading. If this approach is used, ensure that the slope does not cause material to slide out of the truck bed from the back. Never dump a load on a slope where the back wheels are at a lower elevation than the front wheels because it will shift the truck's center of gravity backward, possibly tipping the truck. Any stuck or frozen material in the front of the bed (part of bed closest to driver) may cause the truck to overturn when dumping.
- **(HT Q 8.4 C)** You indicated that for end dumping the front wheels are above the back wheels of the truck when observed from the side while moving in the dump area and discharging the load. The geometry of the truck relative to the ground is important for safe and efficient dumping practices. Safety during dumping can be improved with a slight upward slope that puts the rear wheels at a higher elevation than the front wheels. This shifts the center of gravity slightly forward and reduces the risk of the truck tipping over backwards during unloading. When using this approach, ensure that the slope does not cause material to slide out of the truck bed. Never dump a load on a slope where the back wheels are at a lower elevation than the front wheels. It will shift the truck's center of gravity backward, possibly tipping the truck. Any stuck or frozen material in the front of the bed (part of bed closest to driver) may cause the truck to overturn when dumping.
- **(HT Q 8.5 B)** You indicated that for end dumping the ground is not level from side to side while the truck is moving in the dump area and discharging the load. The geometry of the truck relative to the ground is important for safe and efficient dumping practices. Dumping should always be on level ground with the left and right tires at the same elevation to keep the center of gravity of the loaded truck close to the center of the truck. Never dump a load on a side-hill because it will shift the truck's center of gravity, possibly tipping the truck. Any stuck or frozen material in the front of the bed (part of bed closest to driver) may cause the truck to overturn when dumping.

- **(HT Q 8.5 C)** You indicated that for end dumping the ground is soft while the truck is moving in the dump area and discharging the load. Trucks should avoid areas where the ground is soft. This will adversely affect ground stability, the maneuverability of the truck, and shift the truck's center of gravity, possibly tipping the truck. Any stuck or frozen material in the front (part of bed closest to driver) of the bed may cause the truck to overturn when dumping.

- **(HT Q 8.6 A or C)** You indicated that for end dumping the load is either end dumped over the edge or some other form of dumping occurs that is not dumping short of the edge. Although many companies choose to end dump or dump directly over the edge, MSHA does not endorse this practice. To avoid the risk of backing over the slope edge, MSHA recommends best practices for dumping material away from the edge and pushing it over with a dozer or loader [MSHA Dump-Point Inspection Handbook, Appendix D. Dump-Point Safety: Best Practices, Page 27].

- **(HT Q 8.7 A or C)** You indicated that both rear tires of the truck do not reach the berm at the same time when a haul truck is backing up to discharge the load at an end dump. A truck should not back in at any angle where the passenger side rear wheel would touch the berm before the driver side rear wheel. The driver uses the driver's side mirror most of the time. As the driver backs up, looking into the driver's side mirror, he/she sees that there are 10 – 8 – 6 ft to go and continues to back up. By the time the driver's side rear tire touches the berm, the passenger side rear tire may have already gone through the berm. With one rear wheel through the berm, the chances of the truck flipping over or going over the berm are increased. If the driver side wheel reaches the berm first the load may not dump properly over the edge and spillage may occur affecting other trucks' ability to dump at that location. Haul truck drivers should back in parallel to the berm such that both tires hit the berm at the same time, thereby reducing the risk of overrunning the berm.

- **(HT Q 8.8 Yes)** You indicated that during end dumping there are times when a berm is observed to be less than the axle height of the largest piece of equipment that uses that dump. The berm at the rear of the truck is required to be at least the mid-axle height of the largest piece of equipment that uses that dump. Like side berms, it is not there to prevent a vehicle from going over. It's only there to serve as a physical indicator of a stopping point when backing up. The berm serves three functions at a dump point:
 - 1) Shows the location of the edge of the pile.
 - 2) Keeps the heavy weight of the haul truck back away from the edge of the slope by at least the berm width.
 - 3) In the event of an emergency or misjudgment, the berm could help prevent the haul truck from going over the edge of the dump point, although this is not its intended function. (MSHA Dump-Point Inspection Handbook, Page 8)

The inside slope of a berm should be steep, preventing the tires from too easily climbing up and going over the berm. If the inside slope of a berm is cut to steepen it, operators should ensure that a sufficient amount of berm material is initially placed so that after the berm is cut, it will still have an adequate base-width.

- **(HT Q 8.9 No)** You indicated that for end dumping the dump area is not inspected for tension cracks. MSHA regulations require that the dumping area be inspected prior to work commencing and as ground conditions warrant [30 CFR § 77.1004 (a), § 56.9304 (a)]. Training should be provided such that all mobile equipment operators and mine personnel who enter the dump site are aware of what signs to look for and when to take immediate corrective actions. Inspections can be performed by various individuals (e.g., truck drivers, the foreman, or the dozer operator/loader operator). Additionally, good practice is for drivers to monitor the area each time a vehicle enters the dump area. When possible, instruct truck drivers to approach the dump site with the edge of the dump on the driver's side, thereby enabling them to see the ground about 16 ft away out of the driver side window. Approaching the dump site with the edge opposite the driver's side may not permit a haul truck driver to see cracks due to a limited view and an increase in potential blind spots. If cracks are observed, mine management should be notified and the dump location should be closed off to traffic until remedial action can be taken [30 CFR § 56.20011, Barricades and warning signs].
- **(HT Q 8.10 Yes)** You indicated that there are times when the end dumping area is congested. Ensure that all drivers and equipment operators are familiar with the dumping plan/scheme for the dump area [30 CFR § 56.9303, Construction of ramps and dumping facilities]. Also, ensure that communications between haul truck drivers, dozer/loader equipment operators, and other vehicle drivers are clear, consistent, and followed. Radio contact or hand/visual signals with feedback confirmations are the preferred method of communication between drivers, dozer/loader equipment operators and other vehicles to prevent a safety incident.
- **(HT Q 8.11 Yes)** You indicated that the end dumping area creates difficulty for haul trucks when turning around by causing a driver to reverse more than once or drive too close to the berm. Ensure that dump areas are designed with adequate room such that all equipment using the area will have room to maneuver without difficulty (i.e., without reversing more than once). Consult the OEM or Operation & Maintenance Manual (OMM) for guidance such as turning radius [30 CFR § 56.9303, Construction of ramps and dumping facilities].
- **(HT Q 8.12 No)** You indicated that the end dumping area is not kept free of debris and spillage. Excess debris and spillage should be avoided in the dump areas. If excess material builds up, it could cause the ground to become uneven. If this occurs, a haul truck's center of gravity could be shifted, possibly tipping and overturning the truck [30 CFR § 77.1608(b), Dumping facilities].
- **(HT Q 8.13 Yes)** You indicated that you observed some ramps to the end dump area that appeared to be unsafe or unstable. Any unsafe or unstable areas should be taken out of service until they can be repaired. Until corrective work is completed, MSHA requires that the area be posted with a warning against entry and a barrier installed to impede unauthorized entry when left unattended. [30 CFR § 77.1004 (a and b), Ground control; inspection...; 30 CFR § 77.1608(b), Dumping facilities; 30 CFR § 56.9304 (a), Unstable ground; 30 CFR § 56.20011, Barricades and warning signs].

- **(HT Q 8.14 B)** You indicated that the wheels of the truck are level when observed from the side while moving in the dump area and discharging the load. Safety during dumping can be improved with a slight upward slope that puts rear wheels at a higher elevation than the front wheels. This shifts the center of gravity slightly forward and reduces the risk of the truck tipping over backwards during unloading. Never dump a load on a slope where the back wheels are at a lower elevation than the front wheels because it will shift the truck's center of gravity backward, possibly tipping the truck. Any stuck or frozen material in the front of the bed (part of bed closest to driver) may cause the truck to overturn when dumping.
- **(HT Q 8.14 C)** You indicated that for stockpile dumping the front wheels are above the back wheels of the truck when observed from the side while moving in the dump area and discharging the load. The geometry of the truck relative to the ground is important for safe and efficient dumping practices. Never dump a load on a slope where the back wheels are at a lower elevation than the front wheels. This will shift the truck's center of gravity backward, possibly tipping the truck. Any stuck or frozen material in the front of the bed (part of bed closest to driver) may cause the truck to overturn when dumping. Safety during dumping could be improved by having a slight slope which puts the rear wheels at a higher elevation than the front wheels. This shifts the center of gravity slightly forward, reducing the risk of the truck tipping over backwards during unloading.
- **(HT Q 8.15 B)** You indicated that for stockpile dumping the ground is not level from side to side while the truck is moving in the dump area and discharging the load. The geometry of the truck relative to the ground is important for safe and efficient dumping practices. Dumping should always be on level ground with the left and right tires at the same elevation to keep the center of gravity of the loaded truck close to the center of the truck. Never dump a load on a side-hill because it will shift the truck's center of gravity, possibly tipping the truck. Any stuck or frozen material in the front of the bed (part of bed closest to driver) may cause the truck to overturn when dumping.
- **(HT Q 8.15 C)** You indicated that for stockpile dumping the ground is soft while the truck is moving in the dump area and discharging the load. Trucks should avoid areas where the ground is soft. This will adversely affect ground stability, the maneuverability of the truck, and shift the truck's center of gravity, possibly tipping the truck. Any stuck or frozen material in the front of the bed (part of bed closest to driver) may cause the truck to overturn when dumping.
- **(HT Q 8.16 Yes)** You indicated that there are times when the stockpile dumping area is congested. Ensure that all drivers and equipment operators are familiar with the dumping plan/scheme for the dump area. [30 CFR § 56.9303, Construction of ramps and dumping facilities]. Also, ensure that communications between haul truck drivers, dozer/loader equipment operators, and other vehicle drivers are clear, consistent, and followed. Radio contact or hand/visual signals with feedback confirmations are the preferred method of communication between drivers, dozer/loader equipment operators, and other vehicles to prevent a safety incident.

- **(HT Q 8.17 Yes)** You indicated that the stockpile dumping area creates difficulty for haul trucks when turning around by causing a driver to reverse more than once or drive too close to the berm. Ensure that dump areas are designed with adequate room such that all equipment using the area will have room to maneuver without difficulty (i.e., without reversing more than once). Consult the OEM or Operation & Maintenance Manual (OMM) for guidance such as for the turning radius. [30 CFR § 56.9303, Construction of ramps and dumping facilities].
- **(HT Q 8.18 No)** You indicated that the stockpile dumping area is not kept free of debris and spillage. Excess debris and spillage should be avoided in the dump areas. If excess material builds up, it could cause the ground to become uneven. If this occurs, a haul truck's center of gravity could be shifted, possibly tipping and overturning the truck [30 CFR § 77.1608(b), Dumping facilities].
- **(HT Q 8.19 Yes)** You indicated that you observed some ramps to the stockpile dump area that appeared to be unsafe or unstable. Any unsafe or unstable areas should be taken out of service until they can be repaired. Until corrective work is completed, MSHA requires the area to be posted with a warning against entry and a barrier installed to impede unauthorized entry when left unattended. [30 CFR § 77.1004 (a and b), Ground control inspection...; 30 CFR § 77.1608(b), Dumping facilities; 30 CFR § 56.9304 (a), Unstable ground; 30 CFR § 56.20011 - Barricades and warning signs].
- **(HT Q 8.20 No)** You indicated that bumper blocks are not present at all hoppers where there is a hazard of overtravel or overturning a haul truck. Bumper blocks (or other suitable restraints) should be present at all hoppers [30 CFR § 56.9301, Dump site restraints; 30 CFR § 77.1605 (i and l), Loading and haulage equipment installations]. The restraint should:
 - 1) Provide a good visual indicator of the location of the dump point;
 - 2) Provide the driver with a "contact" point so that if necessary he/she can "feel" that the barrier has been reached; and
 - 3) Be substantial enough to provide restraint or to impede equipment from going over the edge in the event of a misjudgment, operational error, or mechanical problem.
- **(HT Q 8.21 No)** You indicated that the bumper block is not kept free of spillage. When the bumper block is covered with material and excess spillage, a ramp may be created allowing trucks to back up and over. With the presence of the debris, there is no barrier to stop the truck. If spillage is present on the bumper block, no truck should be allowed to dump until it has been cleaned up to allow the bumper block to function as intended [30 CFR § 77.1608(b), Dumping facilities].
- **(HT Q 8.22 No)** You indicated that the edge of the bumper block was not free from excessive wear ensuring that a clean solid edge is provided. Any degradation in the edge of the bumper block reduces the feedback the driver receives when the wheels touch the block. It is important to maintain the bumper block edge properly to keep the clean edge intact so that drivers are aware of the intended stopping point.

- **(HT Q 8.22 Cannot observe)** You indicated that the edge of the bumper block could not be observed. This bumper block should be cleaned and inspected to ensure it is free from excessive wear and that a clean solid edge is provided. Any degradation in the edge of the bumper block reduces the feedback the driver receives when the wheels touch the block. It is important to maintain the bumper block edge properly to keep the clean edge intact so that drivers are aware of the intended stopping point.
- **(HT Q 8.23 B)** You indicated that the wheels of the truck are level when observed from the side while moving in the dump area and discharging the load. Safety during dumping can be improved with a slight upward slope which that puts the rear wheels at a higher elevation than the front wheels. This shifts the center of gravity slightly forward, reducing the risk of the truck tipping over backwards during unloading. Never dump a load on a slope where the back wheels are at a lower elevation than the front wheels. This will shift the truck's center of gravity backward, possibly tipping the truck. Any stuck or frozen material in the front of the bed (part of bed closest to driver) may cause the truck to overturn when dumping.
- **(HT Q 8.23 C)** You indicated that while dumping into a hopper or crusher the front wheels are above the back wheels of the truck when observed from the side while moving in the dump area and discharging the load. The geometry of the truck relative to the ground is important for safe and efficient dumping practice. Safety during dumping could be improved with a slight slope that puts the rear wheels at a higher elevation than the front wheels. This shifts the center of gravity slightly forward, reducing the risk of the truck tipping over backwards during unloading. Never dump a load on a slope where the back wheels are at a lower elevation than the front wheels. This will shift the truck's center of gravity backward, possibly tipping the truck. Any stuck or frozen material in the front of the bed (part of bed closest to driver) may cause the truck to overturn when dumping.
- **(HT Q 8.24 B)** You indicated that while dumping into a hopper or crusher the ground is not level from side to side while the truck is moving in the dump area and discharging the load. The geometry of the truck relative to the ground is important for safe and efficient dumping practice. Dumping should always be on level ground with the left and right tires at the same elevation to keep the center of gravity of the loaded truck close to the center of the truck. Never dump a load on a side-hill because it will shift the truck's center of gravity, possibly tipping the truck. Any stuck or frozen material in the front of the bed (part of bed closest to driver) may cause the truck to overturn when dumping.
- **(HT Q 8.24 C)** You indicated that while dumping into a hopper or crusher the ground is soft while the truck is moving in the dump area and discharging the load. Trucks should avoid areas where the ground is soft. This will adversely affect ground stability, the maneuverability of the truck, and shift the truck's center of gravity, possibly tipping the truck. Any stuck or frozen material in the front of the bed (part of bed closest to driver) may cause the truck to overturn when dumping.

- **(HT Q 8.25 Yes)** You indicated that there are times when the hopper or crusher dumping area is congested. Ensure that all drivers and equipment operators are familiar with the dumping plan/scheme for the dump area [30 CFR § 56.9303, Construction of ramps and dumping facilities]. Also, ensure that communication between haul truck drivers, dozer/loader equipment operators, and other vehicle drivers are clear, consistent, and followed. Radio contact or hand/visual signals with feedback confirmations are the preferred method of communication between drivers, dozer/loader equipment operators, and other vehicles to prevent a safety incident.
- **(HT Q 8.26 Yes)** You indicated that the hopper or crusher dumping area creates difficulty for haul trucks when turning around by causing a driver to reverse more than once or drive too close to the berm. Ensure that dump areas are designed with adequate room such that all equipment using the area will have room to maneuver without difficulty (i.e., without reversing more than once). Consult the OEM or Operation & Maintenance Manual (OMM) for guidance such as for the turning radius [30 CFR § 56.9303, Construction of ramps and dumping facilities].
- **(HT Q 8.27 No)** You indicated that the hopper or crusher dumping area is not kept free of debris and spillage. Excess debris and spillage should be avoided in the dump areas. If excess material builds up, it could cause the ground to become uneven. If this occurs, a haul truck's center of gravity could be shifted, possibly tipping and overturning the truck.
- **(HT Q 8.28 Yes)** You indicated that you observed some ramps to the hopper or crusher dump area that appeared to be unsafe or unstable. Any unsafe or unstable ramps should be taken out of service until they can be repaired. Until corrective work is completed, MSHA requires the area to be posted with a warning against entry and a barrier installed to impede unauthorized entry when left unattended [30 CFR § 77.1004 (a and b), Ground control; inspection...; 30 CFR § 77.1608(b), Dumping facilities; 30 CFR § 56.9304 (a), Unstable ground; 30 CFR § 56.20011, Barricades and warning signs].

Safety Incident Report Form Topic List

- Reporting Person(s) Involvement
 - Participant to incident
 - Driver
 - Passenger
 - Worker on foot
 - Witness to incident
 - Told of incident
 - By participant
 - By witness
 - By another employee not involved or not a witness
- Description of Event
 - Date
 - Time
 - Shift
 - Daylight
 - Afternoon
 - Midnight
 - Location
 - Shop
 - Pit
 - Loading area
 - Dump
 - Other
 - Job position or rank of parties involved (select all that apply including passengers)
 - Management
 - Haul truck driver
 - Mobile equipment operator
 - ❖ Water truck driver
 - ❖ Grader operator
 - ❖ Loader/shovel operator
 - ❖ Pickup truck driver
 - ❖ Other
 - Maintenance
 - ❖ Mechanic
 - ❖ Fuel/lube worker
 - ❖ Tire technician
 - ❖ Other
 - Contractor
 - Other
- Potential incident
 - Vehicle/vehicle collision
 - ❖ Rear-end
 - ❖ Sideswipe
 - ❖ Backing
 - ❖ Head-on
 - ❖ Other
 - Single vehicle/object collision
 - ❖ Head-on
 - ❖ Backing
 - ❖ Sideswipe
 - ❖ Other
 - Vehicle/worker-on-foot collision
 - Other
 - Equipment involved (for all equipment)
 - Make
 - Model
 - Type
 - Short description of incident
 - What could be done to prevent from happening again?
 - How likely is it that this incident will occur again?
 - How severe do you think this accident could have been?
- Contributing Factors (select all that apply)
 - Worker considerations
 - First day back from leave
 - Inexperienced with tasks
 - Illness
 - Fatigue
 - Stress
 - Inaccurate assumptions
 - Complacency/overconfidence
 - Inaccurate view of risk involved

- Work environment
 - Changes/departures from routine job demands
 - Confusing or vague instructions/guidance
 - Lack of standards (e.g., standard operating procedures)
 - Lack of signage
 - Work in new/changed area
 - High pressure/demand
 - Distraction
 - ❖ Radio (belonging to mine)
 - ❖ Radio (personal)
 - ❖ Personal cell phone
 - ❖ Passenger in vehicle
 - ❖ GPS/dispatch screen
 - ❖ Other
- Visibility (nonweather-related)
 - Glare
 - Dirty windows/mirrors
 - Poorly adjusted/broken mirrors
 - Poor/inadequate lighting
 - Blind spot of truck
 - Blind spot of road (e.g., blind curve, hidden entrance)
 - Other
- Poor communication
 - Lack of radio contact
 - Lack of visual contact
 - Unclear/imprecise radio contact
 - Unclear/imprecise visual contact
- Mechanical breakdown
 - Brakes
 - Engine retarder failure
 - Steering
 - Engine/transmission
 - Warning lights
 - Data of last equipment inspection
- Breaking of road rules
 - Speeding
- Improper passing
- No signaling
- Ignoring signage
- Failure to yield right of way
- Unexpected event
 - Animal runs into roadway
 - Berm collapse
 - Rock roll off highwall
- Weather
 - Sunny
 - Cloudy
 - Partly sunny
 - Raining
 - Snowing
 - Icy
 - Windy
 - Generally poor visibility (e.g., fog)
- Ground conditions (nonweather-related)
 - Dusty
 - Muddy
 - Standing water
 - Icy ground
 - Rutted road or potholes
 - Poor/inadequate roadway material (ex: large rocks, loose small rocks)
- Mine design
 - Grading too steep
 - Inadequate overhead clearance
 - Inadequate width clearance

Resources to Consider for Increasing Awareness and Use of Seatbelts on Mine Haul Trucks

Motivating haul truck drivers and other employees to *always wear seatbelts* (as mandated by MSHA 30 CFR Parts [56.14131](#) and [77.1710 \(i\)](#) regulations, MSHA “Rules to Live By,” and mine/quarry policy) when operating their vehicles and equipment is a crucial part of managing a safe and productive mining operation. The following resources are provided for mine/quarry safety management to consider and use as appropriate:

1) Awareness/use Campaigns and Programs. Can stimulate awareness among workers and educate them about seatbelt use to maximize safety for themselves and others.

- ❖ **Unconscious Motivators and Situational Safety Belt Use: Literature Review and Results from an Expert Panel Meeting.** The vast majority of people who do not always wear seatbelts are “situational users,” wearing a seatbelt only when they think it is necessary. Topic highlights include: people do not always know why they do what they do (page 6); find and capitalize on moments where change can occur (page 16); and overcoming denial (page 20). Techniques suggested to promote seatbelt use are campaigns that: (a) focus on the behaviors of “other drivers” as a reason to wear your seatbelt, (b) avoid telling people to wear their seatbelts and rather lead people to see that wearing a seatbelt is a good idea, and (c) focus on milder negative outcomes of seatbelt nonuse (e.g., losing or not receiving monthly safety bonus versus death).
Source: <http://www.nhtsa.dot.gov/people/injury/research/UnconsciousMotivators/images/UnconsciousMotivators.pdf>.
- ❖ **Increasing Safety Belt Use in Your Company: Manual (by USDOT, FMCSA, and CMVSBP).** This document can help mine/quarry management to establish a new program or reinforce or upgrade an existing program. Highlights include: What Drivers Need to Know About Safety Belt Use; Two-Minute Pep Talk: Safety Belts – Habit for Life; How to Evaluate Your Program; How to Reinforce Your Safety Belt Program; Knowledge Tests.
Source: <http://www.fmcsa.dot.gov/safety/safety-belt/increasing-safety-belt-use-your-company-manual>.
- ❖ **Think! Road Safety – THINK!** A UK government website dedicated to road safety information for motor vehicles features information on various campaigns— specifically, one focused on seatbelts. It advises, “Always wear a seatbelt. In a crash, you’re twice as likely to die if you don’t,” and it includes a crash simulator.
Source: <http://think.direct.gov.uk/seat-belts.html>.

2) **Existing Training Resources.** MSHA, Holmes Safety Association, and other training products can be used in conjunction with regular safety meetings and employee safety training as seatbelt training/reminder tools for haul truck drivers and other employees. In addition to those from your own archives, consider the following examples:

- ❖ **MSHA DVD (11 min). Stay in the Cab and Leave It On! A Survivor's Story.** This DVD concerns a loader operator and illustrates the grim consequences of not staying buckled up and in the cab. The accident victim had both legs amputated.
Source: National Mine Health and Safety Academy's 2011 Catalog of Training Products for the Mining Industry, page 42.
- ❖ **MSHA DVD (6 min). Seatbelt Success Story, Part I – The Terry Sanders Story.** In 1980, Terry Sanders was driving an off-road haul truck, lost power and brakes, and sped backwards down a mountain roadway (~ 14 % grade). His advice: don't panic, best decision is to stay in vehicle with seatbelt on.
Source: 2011 Catalog, page 37.
- ❖ **MSHA DVD (7 min). Seatbelt Success Story, Part II – The Roger Newman Story.** A dozer operator tumbled over the highwall in a CAT D10 dozer and survived. Management capitalized on this event to continue emphasizing seatbelt awareness and use with a survey to check if employees wore their seatbelts in personal vehicles on the way to work and rewarded those who did. Employees responded positively to this activity.
Source: 2011 Catalog, page 38.
- ❖ **MSHA DVD (15 min). SLAM Risks the SMART Way – Seatbelt Safety (series of 6 vignettes).** This DVD illustrates how a mine/quarry can positively influence employee attitudes. Haul truck driver, Ed, survives accident and thanks Rick, the Safety Director, at the hospital for compelling employees to wear seatbelts.
Source: 2011 Catalog, page 41.
- ❖ **NIOSH Video. Take Pride in Your Job: Seatbelts.** This video focuses on oil and gas extraction workers and features workers describing their use of seatbelts and sharing their personal stories about why seatbelts should be worn all the time, every time.
Source: NIOSH Publication No. 2009--109d, http://www.youtube.com/watch?v=-XQfagxomkc&list=UUD_7ONlzCC_hdHVSKLnZbGg&index=1&feature=plcp.

3) **Visual Displays.** Billboards, signs, etc. can be used to promote seatbelts on mine property (cited in: Demirer A., Durat M., and Hasimoglu C. Investigation of seat belt use among the drivers of different education levels. Safety Science 50 (2012) 1005–1008). Examples such as those below in Figure 18 may be placed at suitable locations along mine/quarry roadways.



Figure 18: Various visual displays that promote the use of seatbelts.

Source: http://www.roadtrafficsigns.com/RTS/QS/seat_belt_signs.aspx.

4) **Site-specific and MSHA Injury Data.** Can positively motivate employee attitudes toward increased awareness and use of seatbelts.

- ❖ **Statistics.** Can be used to create MS PowerPoint slides or as a one-page flyer posted to the employee safety bulletin board or presented/handed to employees during tailgate talks or shown at the employee monthly safety meeting and scheduled safety training to motivate and increase seatbelt awareness and use at your mine or quarry. Injury statistics and data may be obtained from sources such as NIOSH or MSHA.

Sources: <http://www.cdc.gov/niosh/mining/works/coversheet1560.html>;
<http://www.msha.gov/stats/Statistics.HTM>.

- ❖ **Fatality Reports and Pictures.** Can be used as one-page flyers posted to the employee safety bulletin board or shown at employee safety meetings or scheduled safety training. Examples of these include:

- **Haul Truck Fatality.** On May 31, 2005, an experienced haul truck driver at an underground metal/nonmetal mine was fatally injured while riding in the passenger seat of a haul truck and task training a newly hired miner, see Figure 19. The trainee lost control of the truck, which fell 70 ft and landed on its top. The trainee, who was wearing his seatbelt, was hospitalized overnight for treatment of his injuries. The victim was not wearing his seatbelt.



Figure 19: Overturned haul truck at an underground metal/nonmetal mine where the trainer of a new driver, not wearing a seatbelt, was fatally injured; but the trainee, wearing a seatbelt, survived.

Source: <http://www.msha.gov/FATALS/2005/FAB05m13.asp>.

- **Haul Truck Fatality.** On October 9, 2009, a 48-year old truck driver was fatally injured while operating a loaded DM-886SX Mack tandem axle coal truck, see Figure 20. The victim lost control of the overloaded truck causing the truck to leave the roadway, travel into the left-side drainage ditch, and strike the embankment. The victim was not wearing a seat belt at the time of the accident and apparently attempted to jump or was thrown from the truck.



Figure 20: The driver of an overloaded, tandem-axle haul truck was fatally injured when he may have jumped or was thrown from the cab of the overturned truck.

Source: <http://www.msha.gov/FATALS/2009/FAB09c13.asp>.

- **Haul Truck Fatality.** On Saturday, December 12, 2009, a 52-year old truck driver and chief mechanic received fatal injuries when he exited the truck he was driving (jumped or was thrown from the truck cab) and was struck by the left-rear tandems of the truck, see Figure 21. The truck ran into the berm on the outer edge of the road and struck the victim before overturning onto the haul road. Considering the lack of damage to the truck cab, this fatality may have been prevented if the driver had used the seatbelt and stayed in the truck.



Figure 21: Loaded haul truck overturned onto the haul road and adjacent drainage ditch. The driver was fatally injured when struck by the left rear tandems of the truck.

Source: <http://www.msha.gov/FATALS/2009/FAB09c17.asp>.

- **Haul Truck Fatality.** On September 27, 2009, a 28-year-old truck driver with two years of experience was fatally injured at a copper operation, see Figure 22. He was operating a 240-ton haul truck that left the haul road and climbed a berm, causing it to overturn and land on the haul road. The victim, who was not wearing a seatbelt, fell from the cab of the truck.



Figure 22: A 240-ton haul truck climbed the berm and overturned onto the haul road. The driver, who sustained fatal injuries, was not wearing a seatbelt and fell from the cab of the truck. On the left, the front of a 240-ton haul truck is shown on its side. The truck had climbed the berm. In the right photo, the bottom of the truck is seen after the accident.

Source: <http://www.msha.gov/FATALS/2009/FAB09m16.asp>.

5) **Literature Sources.** Can be resources for mine/quarry management of facts, information, and ideas that may be assembled, distributed, and presented to employees for increasing awareness and use of seatbelts.

❖ **Buckling Up: Technologies to Increase Seat Belt Use – Special Report 278.**

Increasing the use of seatbelts is one of the most effective and least costly ways of reducing the lives lost and injuries incurred on the nation's highways each year. Yet, about one in four drivers and front-seat passengers continues to ride unbuckled. Consequently, Congress requested this 2002 study to: examine the potential benefits of technologies designed to increase belt use, determine how drivers view the acceptability of the technologies, and consider whether legislative or regulatory actions are necessary to enable their installation on passenger vehicles.

Source: <http://onlinepubs.trb.org/onlinepubs/sr/sr278.pdf>.

❖ **Safety Belt Usage by Commercial Motor Vehicle Drivers (SBUCMVD) 2013 Survey – Fact Sheet.** The Safety [Seat] Belt Usage by Commercial Motor Vehicle Drivers (SBUCMVD) Survey is a nationally representative field data collection program that provides estimates of safety [seat]belt restraint use by drivers and other occupants of medium and heavy duty commercial motor vehicles (CMVs). The Survey showed that overall safety [seat]belt usage rate for drivers of all medium and heavy duty trucks and buses rose from 78 percent in 2010 to a new high of 84 percent in 2013.

Source: <https://cms.fmcsa.dot.gov/safety/safety-belt/2013-safety-belt-fact-sheet>.

❖ **2007 Motor Vehicle Occupant Safety Survey, Volume 4: Crash Injury and Emergency Medical Services Report.** This report presents and examines the findings of the 2007 Motor Vehicle Occupant Safety Survey related to crash injury and emergency medical services. Persons not wearing a seatbelt at the time of the (most recent) crash were more likely to be hospitalized from the crash-related injuries than those wearing seatbelts.

Source: <http://www.nhtsa.gov/DOT/NHTSA/Traffic%20Injury%20Control/Articles/Associated%20Files/810977.pdf>

❖ **Countermeasures That Work: A Highway Safety Countermeasure Guide for State Highway Safety Offices, Fourth Edition, 2009 – National Highway Traffic Safety Administration (NHTSA).** The purpose of this guide is to assist State Highway Safety Offices (SHSOs) in the selection of effective, science-based traffic safety countermeasures for major highway safety problem areas. The guide presents: major strategies and countermeasures that are relevant to SHSOs; summaries of their use, effectiveness, costs, and implementation time; and references for the most important research summaries and individual studies.

Source: <http://ntl.bts.gov/lib/30000/30500/30532/811081.pdf>.

❖ **Individual Response to Risk as a Function of Normative Social Pressure: A Pilot Study of Seat Belt Use.** The ability to analyze and predict risk accurately is of little value if people cannot be persuaded to engage in appropriate protective behavior. Attempts to persuade people to deal with collision risk by using protective restraints have failed for predictable reasons. A pilot study was conducted to examine the issues associated with seatbelt use. Normative social pressure was applied in such a way that showed significant increase in individuals' expressed intentions to use seatbelts.

Source: <http://ipmall.info/risk/vol3/summer/boehm.htm>



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