MSHA Annual Refresher Training

Module 3

Traffic Control, Transportation, and Equipment Safety

MSHA Training Requirement:

Instruction on the recognition and avoidance of hazards such as traffic patterns and control, mobile equipment (e.g., haul trucks and front-end loaders). [Section 46.5(b)(2)]

Learning Objectives:

1. Understand the importance of adhering to traffic control and equipment operation procedures in mining operation.
2. Apply safe transportation practices for inspecting, operating, and parking to prevent injuries and equipment instability.
3. Ensure that you can transport people and materials securely.
4. Reduce the risk of hazards and injury when loading and unloading.
5. Identify and describe various safety devices used in mining.
6. Understand the basic maintenance procedures for roadways and worksites.
7. Navigate conveyors, elevated structures, and walkways safely.

Module Sections

- 3.1 How to Safely Operate Your Equipment
- 3.2 Equipment Operation Procedures
- 3.3 Transportation of People and Materials
- 3.4 Safety Devices and Procedures for Roadways and Railroads
- 3.5 Roadway and Worksite Maintenance
- 3.6 Travelways and Ladders

3.1 HOW TO SAFELY OPERATE YOUR EQUIPMENT

Understanding safe equipment operations in the mining industry is critical to ensure the safety of workers and protect equipment. The rules outlined in 30 CFR Part 56 Subpart H (Loading, Hauling, and Dumping) outline specific guidelines to prevent accidents and maintain an organized work environment.

In this module you will review the key regulations that focus on managing traffic control and equipment operations at mine sites.

You will learn how to:

1. Understand the importance of adhering to traffic control and equipment operation procedures in mining operation.
2. Apply safe transportation practices for inspecting, operating, and parking to prevent injuries and equipment instability.
3. Ensure that you can transport people and materials securely.
4. Reduce the risk of hazards and injury when loading and unloading.
5. Identify and describe various safety devices used in mining.
6. Understand the basic maintenance procedures for roadways and worksites.
7. Navigate conveyors, elevated structures, and walkways safely.

3.1: Proper traffic control is essential to maintaining both safety and efficiency at a mining work site

Module Warmup

Why equipment operations matter?

Knowing traffic rules and equipment operation procedures is crucial to ensuring your safety. Mines are complex environments with heavy machinery, vehicles, and workers all operating in close proximity. When you understand the procedures for speed, right-of-way, and transportation of people and materials, you can help maintain an orderly and safe flow of traffic. This will minimize confusion, enhance efficiency, and ensure safe evacuation in case of an emergency. Additionally, when you understand how to inspect, operate, and protect your equipment, then you are reducing hazards for yourself and others.

The rest of this module will help you further understand key equipment operation and transportation concepts, why these areas are important, and how they will help you to move safely and efficiently at a mine site.

3.2 EQUIPMENT OPERATION PROCEDURES

There are many types of equipment you may encounter when working in a mine. In this section, we will look at some general principles, as well as some specific guidelines for operating machinery such as mobile equipment, tramways, and rail equipment.

General Principles

Before operating any equipment, be sure to inspect it and report any defects to the mining operator. Always check to make sure the area is clear of other workers or machines and be sure to operate your equipment in a safe and controlled manner, adhering to the signs and rules posted at the mine site. You will see this advice many times in this section because it is so important!

Additionally, as you are working and when moving between your various job areas, be sure your equipment is properly secured in the travel position. This often involves things such as lowering attachments safely and ensuring proper braking.

Working With Mobile Equipment

Inspecting

Remember, before you begin operating your mobile equipment, be sure you inspect it thoroughly.

Be sure to record and report any defects affecting safety on any equipment to the mine operator; these must be repaired or corrected before you can use the equipment.

Operating

When operating machinery at your work site, follow traffic rules, maintain control and safe speeds, and keep a safe distance.

You may use large machinery that has dippers, buckets, loading booms, or other heavy suspended loads. When doing this, be sure you do not swing heavy loads over the driver's cab of vehicles until the driver has gotten out and is in a safe place, unless the equipment is built to keep the driver safe from falling materials. Similarly, you and other workers should not work, walk, or sit under the heavy loads, buckets, or booms while they are moving.

Sometimes you may use a large mining shovel in your work at the mine. These shovels are often connected by a specific electrical cable for large machines called shovel trailing cables and should not be moved unless you use cable slings or sleds. Slings and sleds are special devices that can safely transport the trailing cable to reduce risk or damage to you and your equipment.

3.2: Whether self-propelled or manually driven, heavy-duty, mobile equipment must always follow the rules listed above to maintain maximum safety

Aerial Tramways

Inspecting

You might encounter an aerial tramway when working at your mine site. These are systems used to transport people and materials in “buckets” that are suspended from cables in areas where typical roads or railways are not possible.

Be sure to record and report any defects affecting safety on any equipment to the mine operator; these must be repaired or corrected before you can use the equipment.

Operating

When operating your aerial tramway, do your best to not start it until the operator has confirmed that everyone is in a secure position.

Rail Equipment

There may be **rail equipment** at the mine site.

If you are working with trains, safety is crucial. Keep control over cars, wear a safety belt if you're moving cars, and don't manually handle cars on curves unless it is safe to do so. Avoid leaving railcars on side tracks, and always securely block parked railcars. Check tram cars for adequate brakes, and always work safely and carefully.

Now, you know a few basic procedures for ensuring your equipment moves safely at your mine site. Next, we will look at using this equipment for transportation of people and materials.

3.3 TRANSPORTATION OF PEOPLE AND MATERIALS

When working at a mine site, you may need to transport people or materials to another location. Following regulations for transporting people and materials will help you to prevent injuries, hazards such as falling materials, or unstable equipment. In this section, we will look at three elements of transportation: (1) transporting persons, (2) loading, hauling, and unloading, and (3), loading and hauling large rocks.

Transporting Persons

In general, it is unsafe to transport people in or on certain equipment at the mine site unless absolutely necessary, and unless you are able to abide by safety measures. It's simply too dangerous!

Rail Equipment

What if you need to use rail equipment to transport someone?
To do this safely, first remember that only authorized people can ride on trains and must sit or stand safely when they are moving. Also be sure you are not riding, standing, or sitting between train cars, at the front or leading end of a train or single railcar, or other areas of a train where you could be injured by the train moving. You must not try to get on or off moving trains. You may ride in the bed of a railcar only if you can do so securely, and you can prevent accidental unloading if the equipment has an unloading feature.

There are exceptions for special situations such as **car droppers**, who may need to access these areas of railway equipment, but they must do so secured with a safety belt and line to prevent from falling.

Similarly, official workers such as brakemen and trainmen should not ride between cars on moving trains, but they may ride on the front or leading end of a train or other locations when necessary to perform their specific job tasks.

Finally, be sure to check your railroad cars to make sure cargo is packed well, especially if they are loaded higher than the confines of the cargo space.

If you wish to use an aerial tramway for transportation, be sure you do not ride in a loaded bucket.

Transporting Materials

When at your mine site, you may need to move mining equipment, supplies, or even waste. Whether and how often you move material will depend upon several factors, such as the size of

your operation, the type of mining being done, and even your specific tasks. Remember to pack carefully, protect the equipment, mark overloaded vehicles, avoid overloading tram buckets, and secure the equipment.

Loading and Hauling Large Rocks

When loading and hauling items, if you see that you need to move large rocks that might cause injury to yourself or others or if the large rocks may make your equipment unstable, you will need to first break the rocks into smaller pieces before moving them. When you are loading trucks or other equipment with materials, be sure to do so carefully so that nothing spills out or shifts and puts you or others at risk.

Now, you are well-prepared for ensuring that people and materials are transported safely. Let's turn to how you can help keep roadways and railroads safe.

3.4 SAFETY DEVICES AND PROCEDURES FOR ROADWAYS AND RAILROADS

The safety devices and procedures for roads and trains are essential at all stages of mining operations to prevent accidents and injuries as well as ensure operational efficiency.

General Guidelines for Roads

Only authorized workers are allowed on roads where trucks and equipment are moving and at places where loading or dumping happens. As we discussed previously, you should find that the traffic rules, signals, and warning signs are the same at every part of the mine and clearly posted for you to see. If there are places on the roads or at loading or dumping areas where you think there is low or narrow clearance, be sure to clearly mark these areas and have warning signs or devices to keep workers safe.

Berms, Guardrails, and Dump Site Restraints

When traveling on a roadway, it is important that barriers, such as **berms** or **guardrails,** are provided and maintained on road edges, especially elevated roadways. This reduces the risk of vehicles tipping over and causing injury or hazard to you and your equipment.

You should find that these barriers are at least as tall as the middle of wheels (or axle) of the largest vehicles being used. You may also see that berms have gaps or openings, which is okay, as long as it is necessary for roadway drainage.

In addition to most roadways, you should also see berms, bumper blocks, safety hooks, or similar devices at dumping locations where there is a risk of vehicles overturning or moving too far. Berms and bumper blocks are placed at the edge of a site to prevent vehicles from going over the edge, whereas safety hooks are designed to secure equipment in place.

Do you remember how there were exceptions in the previous section for railroads? There are also exceptions to berms and guardrails when it comes to rail beds.

Rail Safety

Let's look at some safety procedures for rail equipment, such as railroads, railways, and trams.

First, remember that roadbeds and all elements of the railroad tracks are required to be designed, installed, and maintained to ensure safe operation, especially given the speed and type of transportation used. Be sure that there's always at least 30 inches of space from the farthest projection of moving railroad equipment on one side of the track for workers and equipment to move safely. If that is not possible, mark the area clearly.

Second, when you are working with trams, be sure to put up nets or other barriers to keep things from falling off the tramway and hitting roads, walkways, or buildings below. Similarly, be sure to check for guards that prevent swaying tram buckets from hitting towers.

Next, protect yourself and others from moving or runaway rail equipment. *How should you do this?*

You can begin by confirming that there are barriers such as stopblocks, derail devices, track skates or bumper blocks where needed.

Relatedly, there are several components of a railway track that must be protected to prevent injury. There are often gaps in tracks and rails that can catch your foot if you are not careful. By placing barriers or blocks in the track guardrails, lead rails, and frogs, you reduce the risk that your foot could become stuck or wedged. These elements should also be maintained depending upon how fast and what type of train will use them.

Also, **switch throws** must be installed with enough space to protect **switchmen** from coming in contact with moving trains.

Finally, at railroad crossings, look for or put up signs or signals to warn when trains are coming. Or, you may guard the crossing when trains are passing. Either option allows you to ensure others are aware when a train is coming.

You also want to be sure that the area between the rails is filled or planked. This ensures a stable surface for vehicles to pass over tracks, which reduces the risks of accidents.

3.3: Internal and external railways make up a huge portion of the mining industry, especially as it relates to coal mining. Always pay attention to the rules and precautions surrounding railway transportation.

Construction and Inspection of Ramps, Dumping Facilities, and Ground Stability

When working at the mine, you may use a ramp to move your machine into or out of pits or over steep grades. Ramps help to provide a gradual slope for your equipment to ascend or descend safely. Be sure your ramp is sturdy, wide and tall enough, and kept clean and clear of spills.

Similarly, you will need to ensure your equipment can access **dumping facilities,** which are specific areas designated for depositing mined materials. Only authorized persons are permitted to be in dumping locations.

First, be sure that any dumping locations you are working with are kept clean of water, debris, and spills. You also want to ensure there are protection devices to prevent falling material from hurting you or other workers at all dumping locations.

Both ramps and dumping locations should be strong enough to hold heavy loads. Barriers like berms, bumper blocks, or safety hooks must be used at dumping sites to prevent vehicles from going too far and overturning. Dumping sites must also be wide and tall enough for equipment to have clearance when using the facilities. If there is not enough side or overhead clearance at any dumping location, be sure you mark them clearly to ensure the safety of you and others.

Additionally, it is important that you check dumping locations for unstable ground before starting work. You may also have to check your dumping spot again if ground conditions become unstable or unsafe.

If the ground seems like it cannot hold your loaded equipment or dump truck, be sure to dump materials a safe distance away from the edge of the unstable area to avoid accidents or hazards.

Relatedly, when materials or minerals are moved, **drawholes**, or cavities or depressions in the ground formed during mining operations, can form. If you are working around these drawholes, and there is danger that broken rock or material could shift, be sure you are not positioning yourself over the drawholes unless you are using platforms or safety lines.

Truck Spotters and Warning Devices

Sometimes when you are using equipment, you may need a **truck spotte**r. These individuals guide and signal trucks into position, ensuring safety during loading and dumping.

If you are working with a truck spotter (or you are the truck spotter), be sure you are in a safe location while the truck is backing up or unloading. Spotters may use signal lights to show the

drivers where to go, especially when it's hard to see. If you are working at night, be sure to use the signal lights to direct trucks safely. If the truck driver cannot understand the signals from the spotter, they should stop the truck.

When there are tight spaces or **restricted clearance** for equipment, then warning signs or signals should be installed ahead of the areas. These restricted areas must also be clearly marked for everyone to see.

Chute Safety

When working with equipment, you may encounter a chute. The purpose of chutes is to ensure that materials can flow safely and efficiently from one point to another, reducing spillage or waste.

Sometimes chutes are used with equipment called **stationary sizing devices or grizzlies** that sort material or remove unwanted debris. These are often located at dump and transfer points. When using stationary sizing devices, it is important to ensure that they are securely anchored to keep them from moving.

You are now well-versed in a variety of safety devices that you might see on the work site. Are you ready to look at roadway and worksite maintenance next? Let's go!

3.5 ROADWAY AND WORKSITE MAINTENANCE

Part of your role as a miner is to help maintain your worksite and roadways for safety and visibility. Keeping your paths of travel and working locations clear of material, free of dust, and ensuring that you are communicating clearly with others can all help reduce the risk of accidents. Let's look at a few maintenance guidelines you should know.

Removing Debris and Trimming Material

As you are working at the mining site, be sure to remove water, debris, or spilled material from roadways to prevent hazards. This can help prevent slips, trips, and falls, as well as equipment accidents. Similarly, it is important to trim your stockpile and muckpile surfaces to prevent hazards to you and your equipment.

Reducing Dust

Often, dust can build up at the mining site, which can affect visibility. Be sure you are controlling dust in key locations such as muck piles, material transfer points, crushers, and on major haul roads to ensure workers and equipment operators can continue their work safely. This may also reduce your risk of developing respiratory issues from dust inhalation.

Navigating Equipment

If you are the equipment operator, you should be certain, either through signaling or another way, that all other workers are clear before starting or moving equipment. If you are working with an equipment operator, be sure to tell the person operating the equipment before you get on or off, so that they know you are there. When machines are moving, do not go under big buckets or arms of machines. Be sure you do not try to get on or off moving equipment, unless you are a trainman, brakeman, or car dropper and are required to get off or on slowly moving trains as part of your job.

Also, remember to follow all procedures for inspecting, operating, and parking your equipment. Doing this will ensure your roadway and worksites remain well-maintained and safe for you and others.

You are now aware of some basic maintenance procedures to keep your work site and roadways safe and clear.

3.6 TRAVELWAYS AND LADDERS

When you are working at a mine site, you will need to ensure secure access to work areas to reduce the risk of falls or injury. This section covers procedures for navigating elevated areas, crossing conveyor systems, and using ladders during routine tasks.

Safe Access and Walkways

Ensuring safe access to walkways is crucial to protecting you from accidents in the mining environment.

General Guidelines

In general, you should always find a safe and well-maintained means of access to all working places. Frequently used walkways or travelways should be cleared of snow and ice, either by sanding, salting, or removal, as soon as possible.

Conveyors

When working with conveyors, be sure you use crossovers where it is necessary to cross conveyors.

If the conveyor is moving, then you should look for designated crossover points.

Additionally, you might see walkways alongside conveyors that are elevated off the ground. These walkways must always have a railing on the outer edges – these keep you and others safe. If you see that a conveyor belt does not have guards or protective barriers and has walkways next to it, then you should see emergency stop buttons or cords along their entire length so you can quickly stop them in an emergency.

If the walkways alongside conveyors have a slope or incline, then they should have surfaces that are non-skid. Or, you must be provided with cleats to cross them. By taking these precautions, you can reduce your risk of slipping or falling.

If the conveyor belt itself goes uphill, you should check that it has brakes or backstops to prevent it from accidentally moving backward, which could be dangerous to you and others.

When operating conveyors, first check to see whether you can see the whole conveyor belt from where you start it. If you can, check to make sure no one is on or near it before turning it on. If you can't see the entire conveyor belt, there must be a loud sound or a flashing light to warn people that the conveyor is about to start.

Elevated Structures, Stairs, and Clearances

Whether you are accessing a crossover, elevated walkway, elevated ramp, or stairway, you should find these to be in good condition, of substantial construction, and equipped with a handrail. When necessary, there should also be **toeboards**.

When working on stairs, be sure there's at least seven feet of space above the stairs.

What if there is not enough space?
If there is less than seven feet, you will need to ensure there is a warning sign to indicate that space might be tight, or clearance is low.

Relatedly, if you notice an area where there's not enough space or clearance, and you think it is a hazard for you or other workers, be sure to mark it clearly.

Finally, any holes or gaps above, below, or near where you and others walk or move materials should have railings, barriers, or covers to keep workers and things from falling or tripping. If you find that installing such a barrier is not possible, put up warning signs to let others know that a gap or hole is there.

Ladder Safety Standards

Construction, Installation, and Maintenance

You might have noticed a theme so far: your equipment and workspace should always be well-constructed and maintained. The same goes for your ladders as well! Always check your ladders to ensure they are in good working condition.

If you are using a portable, rigid ladder, be sure you use a sturdy base to securely place your ladder. If you are using a fixed ladder, be sure you firmly anchor it and provide at least 3 inches of space for your toes. Your fixed ladder should also stick out at least 3 feet above the landing, or where the ladder ends, or there should be something to hold onto above the end.
Finally, be sure you do not paint the wooden parts of your ladders, except with a transparent finish. This will help to maintain your ladder's structural integrity and ensure it does not become slippery.

Safe Use and Protection Measures

Now that you know how to install and maintain your ladders, let's look at a few guidelines for safely using ladders when at your work site.

First, when using ladders, be sure you are facing them directly and have both of your hands free for climbing and descending. This will reduce your risk of falling or slipping when using the

ladder. Also, be sure that your fixed ladder is leaning forward, not backward, to ensure safe climbing.

To ensure you have stability and a place to rest during your climb, be sure your fixed ladder has a sturdy platform with railings every 30 feet. If you do not have a railing, then you must use other safety measures like **backguards** or **safety belts**.

Finally, when you use your ladder to reach an elevated area that is difficult to access vertically, you may angle your ladder for better reach. Fixed ladders that are angled between 70 and 90 degrees and are at least 30 feet tall need protection like backguards or cages, starting within seven feet from the ladder's bottom. This will help you to ensure stability and ease of use.

Scaffolds and Platforms

Similarly, when working on an elevated structure, you may use scaffolds to provide stability. Scaffolds and working platforms need to be well-constructed and maintained, with handrails for you to hold onto. The floor boards should be put together correctly and securely, and you should be careful not to put too much weight on them. If needed, there should be toeboards to prevent things from falling off.

Implementing these guidelines will help you to navigate travelways, ladders, and platforms safely and efficiently.