

**MODULE NUMBER 2  
OF  
INSTRUCTION GUIDE NUMBER 43**

**ON-THE-JOB TRAINING MODULES  
FOR  
SURFACE METAL AND NONMETAL MINES**

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## **DOZER OPERATION**



This module describes the basic job steps, potential hazards or accidents, and recommended safe job procedures for dozer operation.

This material is designed primarily for use in the initial training of dozer operators at surface metal and nonmetal mines. The content deals with general operation and clearing and pushing, but this material can be applied to other jobs performed with a dozer. This material should be used by trainers as a supplement to practical knowledge and specific mine conditions.

Dozers are one of the strongest and heaviest pieces of equipment used at surface mines. Dozers can be used effectively for clearing operations, pushing material, grading work, compacting loose material, etc. The most common uses are for clearing and pushing operations.

Accidents involving dozers often result in disabling injuries or fatalities, due to the massive weight of the dozer. Crushing type injuries involving dozers most often result in fatalities. Most of these occur when operators are run over by their own machine. Many other hazards exist, requiring the dozer operator to remain alert at all times.

Self-propelled machines that will be used during a shift must be inspected by the machine operator before operation. Particular attention should be given to the steering and braking systems to ensure proper working order. Headlights, horns, and backup alarm systems must function properly at all times. Seat belts must be provided and worn.

The basic job steps included in this module are:

1. Conduct walk-around check of dozer.
2. Mount dozer and check cab.
3. Start dozer and complete pre-shift examination.
4. Tram dozer to work area.
5. Examine work area.
6. Clear material.
7. Push material.
8. Refuel and park.
9. Perform repairs and maintenance.

The operator's manual provided with the machine, and the mine's operating procedures, should also be used in training machine operators.

The following safe job procedures will help minimize incidents which may cause injuries and adversely affect production:

Required and/or recommended personal protective equipment

Hard hat, safety shoes, safety glasses with side shields, gloves, clothing appropriate for weather conditions, hearing protection where needed

<b>SEQUENCE OF BASIC JOB STEPS</b>	<b>POTENTIAL ACCIDENTS OR HAZARDS</b>	<b>RECOMMENDED SAFE JOB PROCEDURES</b>
1. Conduct walk-around check of dozer.	1. A) Frostbite, hypothermia, sunburn, heat cramps, heat exhaustion.  B) Struck by moving dozer or other equipment.  C) Slips or trips. Struck by flying objects, such as dirt or splashed fluids. Caught in pinch points.	1.A) Dress to suit weather conditions.  B) Check to be sure dozer blade is lowered to ground. Be alert for nearby equipment.  C) Conduct walk-around inspection of dozer. Avoid slick spots, and keep area free of slipping or tripping hazards. Use suitable access if necessary to mount and dismount dozer to check engine or other area of machine.

**SEQUENCE  
OF BASIC JOB  
STEPS**

**POTENTIAL  
ACCIDENTS OR  
HAZARDS**

**RECOMMENDED SAFE JOB  
PROCEDURES**

1. (Continued)

1. C) (Continued)

During walk-around inspection, check:

1. Area around dozer for people or obstructions.
2. All bolts, guards, covers, and mechanical components of dozer to make sure they are in place.
3. Engine compartment for dirt, debris, oily rags, tools. Grasp engine covers firmly when removing. Avoid over-reaching. Get help if needed.
4. Fluid levels. Wear safety glasses with side shields and gloves.
5. Hydraulic oil and coolant lines and hoses for breaks, leaks, rubbing lines or loose fittings,
6. Fire extinguisher (if on outside of machine) to make sure it's in place and fully charged,
7. Ladders, steps, handholds, and handrails for loose bolts, breaks, cracks or missing parts.

D) Defects and hazards not fixed.

D) Report and, if possible, repair any defects found. Do not use equipment with uncorrected safety defects.

2) Mount dozer and check cab.

2. A) Slips and falls. Clothing caught on control levers or other projections.

2. A) Wear snug fitting clothing. Keep steps and boots free of mud, ice, snow, grease, and oil.

**SEQUENCE  
OF BASIC JOB  
STEPS**

**POTENTIAL  
ACCIDENTS OR  
HAZARDS**

**RECOMMENDED SAFE JOB  
PROCEDURES**

2. (Continued)

- |   |  |
|---|--|
| B) Falling from machine.  | B) Use belt hooks, pockets, etc., to carry materials up to cab. Keep both hands free for climbing. Use handholds and select firm footing. Avoid haste and projections. |
| C) ROPS/FOPS failure in a rollover or falling object accident.<br>Missing or inoperative fire extinguisher. | C) Check for any damage to rollover/falling object protective structure. Check fire extinguisher (if located at cab).  |
| D) Struck by flying objects.<br>Jammed controls.<br>Projecting control levers.                              | D) Remove or secure any loose objects in cab. Avoid projections.   |
| E) Accident caused by poor visibility.  | E) Inspect and clean windows and mirrors. Adjust mirrors if necessary.   |
| F) Improper seat adjustment may not allow maximum brake pedal pressure in an emergency.                     | F) Be sure seat is properly adjusted.  |
| G) Thrown against cab interior, or thrown out of the machine.   | G) Make sure seat belts are provided and in good condition. BUCKLE UP!   |

<b>SEQUENCE OF BASIC JOB STEPS</b>	<b>POTENTIAL ACCIDENTS OR HAZARDS</b>	<b>RECOMMENDED SAFE JOB PROCEDURES</b>
2. (Continued)	H) Equipment malfunction.	H) Check all instruments and gauges to be sure they are not stuck. Make sure all controls are in neutral position, and parking brake is set.
3. Start dozer and complete pre-shift examination.	<p>3. A) Hitting or running over persons or objects in area. Striking inside of cab if dozer moves suddenly.</p> <p>B) Engine or auxiliary equipment malfunction.</p> <p>C) Engine or decelerator malfunction.</p> <p>D) Poor visibility. Poor operation.</p> <p>E) Loss of control.</p>	<p>3. A) Check equipment for warning tags. Be sure blade is lowered to ground. Check controls to be sure they are in neutral. Sound horn before starting or moving. Check backup alarm after start-up.</p> <p>B) Let engine run at low idle until it reaches normal operating temperature. Check gauges and warning lights again for normal readings.</p> <p>C) Check engine for smooth idle, and unusual smoke or noise. Check decelerator operation.</p> <p>D) Check wipers and lights. Check hydraulic controls.</p> <p>E) Check brakes and steering after moving a short distance. Brakes may also be checked against partial engine power before moving, according to company policy. Check transmission operation.</p>

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURES
4. Tram dozer to work area.	4. A) Personal injury.  B) Running over someone.  C) Poor visibility, poor stability, overturning dozer, striking other equipment or people.  D) Caught in pinch points.  E) Overturning dozer.  F) Loss of steering and/or brakes. Collisions.	4. A) Do not allow anyone to ride outside the cab for any reason. No one shall ride with the operator unless safe seating facilities are provided.  B) Sound horn before starting to tram.  C) Observe travel area. Adjust speed for conditions. Tram with blade low (15 to 20 inches off the ground).  D) Keep doors latched securely.  E) Travel at acceptable speeds for conditions. Avoid loose material, slick spots, and weak areas. Observe road hazards, and travel in stable areas.  F) Monitor gauges/indicators. Follow traffic rules.
5. Examine work area.	5. A) Falling material from highwall or fill. Loose ground.  B) Struck by moving equipment.	5. A) Stop dozer a safe distance away from highwall or fresh excavations where loose material could be a hazard.  B) Observe area for other equipment. If leaving dozer, lower blade, set brakes, and shut-off the engine.

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURES
5. (Continued)	<p>C) Slipping/tripping hazards.</p> <p>D) Struck by falling material.</p> <p>E) Slips and falls. Hypothermia.</p>	<p>C) Select firm footing, avoid slick spots. Be aware and cautious of mud, snow, ice, loose material and steep inclines.</p> <p>D) Inspect working areas for:</p> <ol style="list-style-type: none"> <li>1. Overhanging material,</li> <li>2. Loose rock,</li> <li>3. Vertical and horizontal cracks,</li> <li>4. Boulders, trees, or other material which might fall or roll,</li> <li>5. Jagged sections of highwall,</li> <li>6. Undercuts,</li> <li>7. Sliding or falling material,</li> <li>8. Miscellaneous debris,</li> <li>9. Compliance with standard procedures for degree of slope, benching, etc.</li> </ol> <p>E) Be aware of weather changes which affect ground conditions including rain, snow, freezing, and thawing. Dress for weather conditions.</p>
6. Clear material.	6. A) Loss of brakes, equipment damage, dozer overturning, steep slopes, operator error.	6. A) Avoid overheating brakes. Maintain dozer stability. Avoid turning sideways. Frequently check gauges to be sure fluid pressures are adequate, preventing engine shutdown and transmission shifting. Be sure you know location and use of appropriate controls.

**SEQUENCE  
OF BASIC JOB  
STEPS**

**POTENTIAL  
ACCIDENTS OR  
HAZARDS**

**RECOMMENDED SAFE JOB  
PROCEDURES**

6. (Continued)

B) Dozer over-  
turning,  
inefficient  
operation,  
equipment  
damage, flying  
brush, caught  
in pinch points.

B) Keep blade down and avoid  
running on downed material, such  
as felled trees. Operate in gear  
consistent with the area and  
material being cleared. Keep doors  
closed and securely latched.

C) Ground  
personnel  
struck by  
dozer, tree,  
cable, etc.

C) Frequently check location of any  
ground personnel to ensure they  
are not in path of dozer or in an  
area where they could be struck by  
flying brush, falling trees, etc.

D) Skidding or  
sliding, steep  
slopes, striking  
ground person-  
nel, unstable  
ground, poor  
visibility.

D) Use extra caution if clearing in rain,  
snow, ice or other conditions that  
could reduce traction. Be aware of  
limited sight distance in fog, rain,  
dust, or snow; operate at lower  
speeds to allow quicker stops, etc.

E) Skidding or  
sliding.

E) Rocks, loose material, heavy  
vegetation, etc., will reduce traction  
and cause sliding/ skidding when  
braking. Operate in gear consistent  
with material, reduce load that is  
being pushed and operate in  
direction that will provide most  
traction and best braking surface.

**SEQUENCE  
OF BASIC JOB  
STEPS**

**POTENTIAL  
ACCIDENTS OR  
HAZARDS**

**RECOMMENDED SAFE JOB  
PROCEDURES**

7. Push material.

7. A) Sliding equipment. Ground failure under weight of dozer.

B) Striking other equipment or persons.

C) Skidding or sliding, steep slopes, striking ground personnel, unstable ground, poor visibility.

D) Falling or sliding material, inefficient operation.

7. A) Be alert for ground conditions which may cause accidents; loose material, large rocks and ice can result in sliding equipment. Steep slopes, cut out areas, and freeze-thaw cycles can result in weak areas that cannot support the weight of a dozer, causing the ground to break under the dozer. Avoid these areas, or repair and compact prior to beginning work. Wear seat belts at all times.

B) Be aware of other equipment operating in the area. Frequently check the location of other equipment. Keep lights and back-up horns in operating condition.

C) Use extra caution if operating in rain, snow, ice or other conditions that could reduce traction. Be aware of limited sight distance in fog, rain, dust, or snow; operate at lower speeds to allow quicker stops, etc. Keep in mind that adverse weather can cause ground conditions to change rapidly, check for these changes and adjust operation accordingly and report them to your supervisor.

D) Frequently check highwalls and storage piles. Keep blade low, and operate in gear needed for the material being worked.

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURES
7. (Continued)	<p>E) Loss of braking and/or steering, equipment damage, inefficient operation.</p> <p>F) Overturning dozer, or going over the edge. Operator error.</p>	<p>E) While working, monitor gauges and performance for proper pressures, temperatures, and possible equipment damage. Report damaged/faulty equipment to your supervisor and have repairs made before continuing. Operate the dozer for maximum performance at all times.</p> <p>F) Leave berms along edges of slopes. Concentrate on work at all times. Do not over estimate your ability or the capabilities of the dozer. DO NOT take chances. Be sure you know location and function of controls.</p>
8. Refuel and park.	<p>8. A) Struck by equipment, fuel spillage, fire hazard.</p> <p>B) Slips and falls. Clothing caught on control levers or other projections.</p> <p>C) Fuel on skin and in eyes.</p>	<p>8. A) Park at refueling station, place controls in neutral, set brakes, lower blade until firmly seated, and shut off engine. No smoking at or near the refueling station.</p> <p>B) Dismount dozer (see 2. A-B). DO NOT JUMP. Check surrounding area for loose material and slick spots.</p> <p>C) Take fuel hose from storage rack, remove tank cap slowly and pump fuel into tank.</p>

**SEQUENCE  
OF BASIC JOB  
STEPS**

**POTENTIAL  
ACCIDENTS OR  
HAZARDS**

**RECOMMENDED SAFE JOB  
PROCEDURES**

8. (Continued)

D) Trips, slips,  
and falls, fire  
hazard.

D) Avoid fuel spillage and keep area free of extraneous materials. If necessary to climb on dozer to refuel, use steps, available rails or handholds. Keep walking or standing areas free from slipping and/or stumbling hazards. Avoid fuel spillage onto hot engine parts.

E) Fire hazard,  
fuel spillage or  
discharge.

E) Shut off fuel, remove nozzle hose, and replace fuel cap. Return hose to rack.

F) Collision,  
runaway  
equipment,  
traffic  
obstruction.

F) Park only at designated parking areas and always set brakes. Avoid parking on inclines or haulroads. If parking on a haulroad is required, pick the safest place.

G) Unsecured  
raised equip-  
ment, runaway  
equipment.

G) Lower blade to ground. Place controls in neutral position. Engage parking brake.

H) Caught  
between parts  
of dozer.

H) Keep yourself and other personnel out of pinch points while dozer is operable.

I) Engine  
damage.

I) Idle engine for a short period of time and then shut it off.

J) Struck by other  
equipment.

J) Observe parking area for other moving equipment before leaving dozer. Make other operators aware of your presence.

K) Slips and falls,  
clothing caught  
on control  
levers or other  
projections.

K) Dismount dozer (see 2. A-B). DO NOT JUMP. Check surrounding area for loose material and slick spots.

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURES
8. (Continued)	L) Hazards due to lack of communication.	L) Always inform appropriate personnel of any abnormal conditions, defects, changes made in equipment and/or job procedure or condition.
9. Performing repairs and maintenance (if applicable).	9. A) Personal injury from improper procedure.	9. A) Do not attempt repairs or maintenance you do not understand and are not trained to do.
	B) Caught by or struck by moving or falling parts, or moving machine.	B) Do not attempt any repairs or maintenance until the power is off and the machinery is blocked against motion and all raised equipment lowered. If necessary to perform work on a raised piece of equipment, securely block in place. Remove ignition key to prevent dozer from being started while work is performed.
	C) Struck by material falling from machine.	C) Do not attempt repairs or maintenance until any material frozen to frame, blade, etc., has been removed.

## GENERAL INFORMATION

This module is part of an Instruction Guide that was developed to assist the surface metal and nonmetal mining industry in conducting effective on-the-job training (OJT) of new employees, or employees reassigned to different jobs. The use of training materials, such as this module, is an important part of an effective, systematic, OJT program.

This Instruction Guide uses a generic Job Safety Analysis (JSA) of jobs common to the industry. The JSA format facilitates uniform basic training in safe job procedures, while requiring only a minimum of time and effort on the part of the trainer. This material is generic to the industry; therefore, each company using this guide will need to tailor the material somewhat to fit their particular requirements. In some cases, the material must be general in nature, and will not include specific details of procedures or equipment that must be taught by the trainer.

Recommendations for an overall OJT program are contained in the Mine Safety and Health Administration (MSHA) guide: "Structuring Effective On-The-Job Training Programs," June, 1983.

## TRAINING RECOMMENDATIONS

On-the-job training is usually best done by the employee's immediate supervisor. If the supervisor relies on another employee to do certain parts of the training, the supervisor should be present to monitor the training. OJT is conducted at the actual job site where the work will be done.

The supervisor/trainer should use the training materials (this module, or other materials) while the training is being done, to help ensure that all job steps are covered, and that no important safety precautions are omitted. Effective OJT should begin with an explanation (lecture and/or discussion) of the safe job procedure. The explanation should be followed by a hands-on demonstration of the proper job procedure. A good demonstration is, perhaps, the most important part of OJT. The demonstration is followed by supervised practice, during which the supervisor/trainer coaches (corrects and encourages) the employee, and evaluates when the employee is ready to do the job without direct supervision.

The first step – explaining the job to the employee – can be done in different ways. The supervisor/trainer and the employee can sit down and go through the training materials together. It may be advantageous to provide the employee with a copy of the training modules that are applicable to his/her job. The fact that most of the training is conducted at the job site does not preclude the use of a classroom or a quiet office for the first part of the training. Any general theory or knowledge training, as well as the initial explanation of the job procedure, may be best done in an office/classroom setting; especially when noise levels, or other conditions at the job site, make communication difficult. A complete series of job steps could be presented through the use of slides developed at the mining operation.



