MODULE NUMBER 1
OF
INSTRUCTION GUIDE NUMBER 43

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

FRONT-END LOADER OPERATION

This module describes the basic job steps, potential hazards or accidents, and recommended safe job procedures for front-end loader operation.

Front-end loaders are probably the most versatile machines utilized at surface metal and nonmetal mines. The front-end loader can be used for many purposes, including: loading haulers, pushing material, grading, hauling material, and working stockpiles or spoil areas. Front-end loaders, typically with 14-16 cubic yard buckets, are sometimes used for stripping overburden. The most common use at surface mines is for loading waste rock haulers and ore haulers.

This module is designed primarily for use in the initial training of front-end loader operators. The content deals with the loading of haulers or bins and hoppers, but can be applied to other jobs performed by a loader. The material should be used by the trainer as a supplement to practical knowledge and specific mine conditions.

Many surface metal and nonmetal miners are injured or killed each year in loader accidents. Loader accidents frequently occur when tramming an unloaded machine at high speed. Accidents also result from collisions with other machines, a person getting caught in pinch points, and spillage of material while tramming or loading. Numerous other hazards exist, and loader operators must be aware at all times of hazards that can cause injury.

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, in order 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 loader.
2. Mount loader and check cab.
3. Start loader and complete pre-shift examination.
4. Tram loader to work area.
5. Load bucket.
6. Tram to dump area.
7. Dump material.
8. Tram back to loading area.
9. Refuel and park.
10. 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

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURES
1. Conduct walk-around check of loader.	1. A) Frostbite, hypothermia, sunburn, heat stroke, heat cramps, heat exhaustion.	1. A) Dress to suit weather conditions.
	B) Struck by moving loader or other machines.	B) Check to be sure loader bucket is lowered to ground, and, if parked on a grade, wheels are blocked and/or turned into a bank. Be alert for nearby machines.
	C) Slips or trips, struck by flying objects such as dirt or splashed fluids, caught in pinch points.	C) Conduct walk-around inspection of loader. Avoid slick spots and keep area free of slipping or tripping hazards. Be especially careful of ruts, uneven ground, and frozen ground. Use suitable access if necessary to mount and dismount loader to check engine or other area of machine.

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURES
1. (Continued)	C) (Continued)	Check: 1) Tires and wheels for lug nuts, cracked rims, cuts, tire pressure. 2) Area around loader for people or obstructions. 3) All bolts, guards, covers, and mechanical components of loader to make sure they are in place. 4) Engine compartment for dirt, debris, oily rags, tools. Grasp engine covers firmly when removing. Avoid over-reaching. Get help if needed. 5) Fluid levels. Wear safety glasses with side shields and gloves. Remove tank caps or covers carefully. 6) Hydraulic oil and coolant lines and hoses for breaks, leaks, rubbing lines or loose fittings, especially in the pivot area. 7) Fire extinguisher (if on outside of machine) to make sure it's in place and fully charged. 8) Loader linkage for loose pins or cracks in lift arms, bucket attachment and bucket itself. 9) Ladders and steps for broken rungs, loose bolts, breaks, cracks, missing parts, or bent and twisted steps.

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURES
1. (Continued)	D) Sludge deposits, or ice, which might prevent valve operation - tank rupture from excessive pressure.	D) If loader has air brakes, bleed the air lines to release any condensation that might have accumulated, and trip the pressure relief to be sure it's operable.
2. Mount loader and check cab.	2. A) Slips and falls, clothing caught on control levers or other projections.	2. A) Wear snug fitting clothing. Keep ladders and boots free of mud, ice, snow, grease, and oil.
	B) Falling from ladder.	B) Use belt hooks, pockets, etc., to carry materials up ladders, and keep both hands free for climbing. Ropes can be used to hoist bulkier items. Face ladder and use three points of contact when climbing (two hands and one foot, or two feet and one hand, in contact with ladder at all times). Use handholds and select firm footing. Avoid haste and projections.
	C) Sudden machine movement on some loaders (even with engine off), falling from loader.	C) Do not use steering wheel as a grab point.

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURES
2. (Continued)	D) ROPS failure in a rollover, canopy failure in a falling object accident. Missing or inoperative fire extinguisher.	D) Check for any damage to rollover protective structure or falling object protective structure. Check fire extinguisher.
	E) Struck by flying objects, jammed controls, projecting control levers.	E) Remove or secure any loose objects in cab. Avoid projections.
	F) Accident caused by poor visibility.	F) Inspect and clean windows and mirrors. Adjust mirrors if necessary.
	G) Thrown against cab interior, or thrown out of the machine.	G) Make sure seat belts are provided, and are in good condition. Seat belts must be worn by the operator.
	H) Machine malfunction.	H) Check all instruments and gauges before start-up to be sure they aren't stuck. Make sure all controls are in neutral position, and parking brake is set.
3. Start loader and complete pre-shift examination.	3. A) Hitting or running over persons or objects in area. Striking steering wheel or other parts of cab if loader moves suddenly.	3. A) Check machine for warning tags. Be sure bucket 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.

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURES
3. (Continued)	B) Engine or auxiliary equipment malfunction.	B) Let engine run until it reaches normal operating temperature. Check all gauges, indicators, and warning lights again for normal readings.
	C) Engine malfunction.	C) Check engine for smooth idle and unusual smoke or noise.
	D) Poor visibility. Poor operation.	D) Check wipers and lights. Check hydraulic controls.
	E) Emergency steering failure.	E) Check emergency steering, if equipped and if recommended by manufacturer.
	F) Loss of control.	F) Check brakes and steering after moving a short distance. Brakes may also be checked against partial engine power before moving, according to company policy or manufacturer's recommendations. Check transmission operation.
	G) Potential hazards not corrected.	G) Report and, if possible, repair any defects found. Do not use machine with uncorrected safety defects. If the loader is unsafe and removed from service, tag it to prohibit further use until repairs are completed.
	H) Hearing loss.	H) Use ear protection when necessary.

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURES
4. Tram loader to work area.	4. A) Personal injury.	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) Running over someone.	B) Sound horn before starting to tram.
	C) Poor visibility, poor stability, overturning loader, striking other machines or people.	C) Observe travel area. Adjust speed for conditions. Tram with bucket low (15 to 20 inches off the ground) to increase stability.
	D) Caught in pinch points.	D) Keep doors latched securely.
	E) Overturning loader.	E) Travel in proper gear at acceptable speeds for conditions. Avoid loose material, slick spots, and weak areas. Observe road hazards, and travel in stable areas.
	F) Loss of control, overturning loader.	F) When carrying a loaded bucket down a steep grade, travel in reverse.
	G) Loss of control, overturning loader.	G) Control speed and slow down carefully if loader starts "road-walking."
	H) Loss of steering and/or brakes - collisions.	H) Monitor gauges/indicators. Follow traffic rules.
	I) Struck by falling ore or rock.	I) Stay out from under swing of dragline.

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURES
5. Load bucket.	5. A) Obstructed work area.	5. A) Clean loose material from loading area.
	B) Falling or sliding material.	B) Work material from toe, or in a manner which eliminates hazardous rolling or sliding of material. Shake off excess material before tramming out of loading area. If working next to a highwall, visually check it on a regular basis for changing and/or hazardous conditions.
	C) Buried at toe of stockpile by falling or sliding material. Failure of ground under machine weight at top of stockpile.	C) When loading from stockpile, do not allow hazardous overhangs or excessive slope angle to develop. Work material from top if necessary to maintain stockpile stability.
	D) Falling or sliding of loose, unconsolidated material.	D) Avoid digging into loose rock or tailings banks which are higher than bucket reach.
	E) Overturning loader.	E) Watch for "soft spots," particularly on tailings pond reclamation work.
	F) Rapid tire wear, slashes and gashes in tire side walls.	F) Avoid spinning the wheels, especially in wet conditions. If loader is equipped with a variable torque converter, adjust to a lower setting.
6. Tram to dump area.	6. A) All hazards in Step 4 apply.	6. A) All procedures in Step 4 apply.

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURES
6. (Continued)	B) Running over stationary objects, other personnel, and vehicles.	B) Check before backing, and keep backup alarm working.
	C) Reduced stability and visibility.	C) Tram at speed consistent with load and area conditions. Keep bucket low off ground for maximum stability and visibility.
	D) Loss of control - overturning loader.	D) Travel in reverse only when carrying a loaded bucket down a steep grade.
7. Dump material.	7. A) Spillage.	7. A) Position haulers perpendicular to, and backed into, material so that spillage stays close to pile.
	B) Overturning loader.	B) Load and dump on the level or uphill for greater stability. Avoid having dumping point downhill from loading point.
	C) Falling material, equipment damage, excess spillage.	C) Raise bucket while positioning loader, and tilt bucket forward to avoid spillage. Raise bucket only to height necessary for clearance. Avoid striking hauler or hopper with bucket or loader.
	D) Excess spillage, overturning, knocking hauler operator against something.	D) Position loader to avoid spillage on the off side. Make motions smooth. Tilt bucket slowly to reduce shock of sudden drop of material, and flying material. DO NOT swing loads over operating compartments of other equipment.

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURES
7. (Continued)	E) Running over persons, falling material.	E) Be sure that other workers are clear before positioning or dumping. Have hauler operators stay in cabs or clear of dump area.
	F) Poor handling of hauler because of unbalanced load.	F) Distribute load evenly in haulers.
	G) Inefficient operation.	G) Signal hauler operator when hauler is loaded.
	H) Caught in material flow, suffocation.	H) If a hangup occurs while dumping material into a bin or hopper, do not attempt to free the material yourself unless you are experienced in this type of work. If the bin or hopper must be entered, the equipment must be locked out, and a safety belt and line must be used. The lifeline must be tended by a second person, with minimum slack maintained.
8. Tram back to loading area.	8. A) Same as Steps 4 and 6.	8. A) Same as Steps 4 and 6
9. Refuel and park.	9. A) Struck by machinery, fuel spillage, fire hazard.	9. A) Park at refueling station, place controls in neutral and set brakes. No smoking at or near the refueling station.

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURES
9. (Continued)	B) Slips and falls. Clothing caught on control levers or other projections.	B) Dismount loader (see Job Procedures 2.A-C).
	C) Fuel on skin and in eyes.	C) Wear safety glasses. Take fuel hose from storage rack, remove tank cap slowly, and pump fuel into tank.
	D) Trips, slips, and falls. Fire hazard.	D) Avoid fuel spillage, and keep area free of extraneous materials. If necessary to climb on loader to refuel, use access ladder, steps, available rails or handholds. Keep all 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 machine, traffic obstruction.	F) Park only at designated parking areas, and always set brakes. Avoid parking on inclines or haul roads. If necessary to park on an incline, turn wheels into bank and/or block securely. If parking on a haul road is required, pick the safest place.
	G) Unsecured raised equip-ment, runaway machine.	G) Lower bucket to ground. Place controls in neutral position. Engage parking brake.
	H) Engine damage.	H) Idle engine for a short period of time and then shut it off.

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURES
9. (Continued)	I) Slips and falls, clothing caught on control levers or projections.	I) Dismount loader (see Job Procedures 2.A-C).
	J) Hazards due to lack of communication.	J) Always inform appropriate personnel of any abnormal conditions, defects, changes made in machine and/or job procedure or condition.
10. Perform repairs and maintenance (if applicable).	10. A) Personal injury from improper procedure.	10. 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, the machinery is blocked against motion, and all raised equipment lowered. If necessary to perform work above, under, or around a raised piece of equipment, block or mechanically secure the equipment to prevent accidental rolling, falling, or lowering. Remove ignition key to prevent loader from being started while work is performed. Tag out machine.
	C) Struck by material falling from machine.	C) Do not attempt repairs or maintenance until any frozen material under machine frame, bucket, 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.