MODULE NUMBER 4
OF
INSTRUCTION GUIDE NUMBER 43

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

PAN SCRAPER OPERATION

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

Pan scrapers are used at surface metal and nonmetal mines for removing and spreading top soil, which is necessary for reclamation purposes; and for selectively removing and hauling ore or waste material. Scrapers are designed for operation on level, or relatively even terrain, and are generally used in the open pit mining system.

Pan scraper operators must be aware of some of the same general types of hazards as other mobile equipment operators, such as slips and falls, overturning, and collisions.

Slips and falls most often occur when mounting and dismounting, refueling, and cleaning windows or mirrors. Overturning can occur due to excessive speed for conditions, inadequate roadway width, traveling too close to roadway edges, lack of roadway berms, loss of control, etc. Collisions can be caused by failure to yield right of way, restricted visibility, and improper roadway width.

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 scraper.
2. Mount scraper and check cab.
3. Start scraper and complete pre-shift examination.
4. General operation.
5. Load material.
6. Push other equipment.
7. Haul material.
8. Operate on grades.
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 scraper	1. A) Frostbite, hypothermia, sunburn, heat stroke, heat cramps, heat exhaustion.	1. A) Dress to suit weather conditions.
	B) Struck by moving scraper or other equipment.	B) Check to be sure scraper bowl is lowered to ground and, if parked on a grade, that wheels are blocked and/or turned into a bank. Be alert for nearby equipment.
	C) Slips or trips, struck by flying objects such as dirt or splashed fluids, caught in pinch points.	C) Avoid slick spots and keep area free of slipping or tripping hazards. Use suitable access if necessary to mount and dismount scraper 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)	When conducting walk-around inspection, check: 1. Tires and wheels for lug nuts, cracked rims, cuts, tire pressure. 2. Area around scraper for people or obstructions. 3. All bolts, guards, covers, and mechanical components of scraper 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. 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. Gooseneck for loose pins or cracks. 9. Ladders and steps, for loose bolts, breaks, cracks, or missing parts.

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) Bleed the air lines to release any condensation that might have accumulated, and trip the pressure relief valve to be sure it's operable.
	E) Uncorrected potential hazards.	E) Report and, if possible, repair any defects found. Do not use equipment with uncorrected safety defects.
2. Mount scraper 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.
	B) Falling from machine.	B) Use belt hooks, pockets, etc., to carry materials up to cab, 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) ROPS/FOPS failure in a rollover or falling object accident. Missing or inoperative fire extinguisher.	C) Check for any damage to rollover/falling object protective structure. Check fire extinguisher (if located at cab).

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURES
2. (Continued)	D) Struck by flying objects, jammed controls, 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) Thrown against cab interior or thrown out of the machine.	F) Make sure seat belts are provided and in good condition. BUCKLE UP!
	G) Equipment malfunction.	G) Check all instruments and gauges to be sure they aren't stuck. Make sure all controls are in neutral position and parking brake is set.
	H) Steering failure in an emergency.	H) Test emergency steering to make sure it is functioning properly.
3. Start scraper 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 scraper moves suddenly.	3. A) Check equipment for warning tags. Be sure bowl 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.
	B) Engine or auxiliary equipment malfunction.	B) Let engine run at low idle until it reaches normal operating temperature. Check gauges and warning lights again for normal readings.

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURES
3. (Continued)	C) Engine malfunction.	C) Check engine for smooth idle and unusual smoke or noise.
	D) Poor visibility. Poor operation.	D) Check wipers, lights, and hydraulic controls.
	E) Loss of control.	E) Check brakes, retarder 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.
4. General operation.	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) Overturning and/or collision.	B) Keep your machine under control at all times. Use prudent operating speeds consistent with conditions present. Do not coast.
	C) Overturning, bank or roadway failure.	C) Use extreme care to avoid tipping when working on hills, banks, top soil, stockpiles, or slopes. Do not get on excessive side grades. Stay a safe distance from edge of pit and slide areas.
	D) Overturning, loss of control.	D) Use extreme caution when crossing side hills, ridges, ditches, and other obstructions. Cross ditches and side hills at an angle and proceed slowly.

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURES
4. (Continued)	E) Collision with embankment. Overturning.	E) Slow down before turning. Do not cut a corner too close when making a sharp turn. Allow enough clearance. Never turn sharply uphill or downhill.
5. Loading of material.	5. A) Loss of control.	5. A) Approach cut at reduced speed.
	B) Equipment damage.	B) Avoid excessive spinning of wheels.
	C) Loss of control, overturning.	C) Always carry the load as low as conditions permit to maintain stability.
6. Pushing other equipment.	6. A) Jack-knifing, loss of control.	6. A) Maintain alignment during pushing.
	B) Loss of control, equipment damage.	B) Make sure there is a coordination of signals between vehicles when pushing.
7. Hauling material.	7. A) Loss of control, bank or roadway failure.	7. A) Avoid large obstacles, deep holes, and soft edges.
	B) Collision.	B) Passing equipment should be done only where there is adequate clearance and visibility. Follow at a safe distance.
	C) Collision.	C) Follow traffic patterns and yield right of way to loaded haulage vehicles.

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURES
7. (Continued)	D) Striking people, other equipment, obstructions, etc.	D) Use headlights in case of poor visibility such as fog, rain, snow, and at sundown.
	E) Loss of control, collision.	E) Traffic rules, signals, and warning signs must be followed at all times.
	F) Backing over persons, embankments, or striking other equipment or objects.	F) Be extra cautious when backing up. Blind spots may hinder your rear vision.
8. Operation on grades.	8. A) Loss of control, equipment damage.	8. A) Always anticipate grades and select proper gear range accordingly. Do not coast.
	B) Brake failure.	B) Avoid applying brake continuously on a long downgrade unless system is so designed.
	C) Equipment damage, loss of control.	C) Downshift one speed range at a time. Downshift only when scraper speed has decreased to proper speed range.
	D) Loss of control.	D) Downshift if necessary for an upgrade to avoid stalling the engine.
	E) Brake failure.	E) Use brakes firmly in one application. Avoid pumping the brake pedal. Repeated light applications of the brake may exhaust the air pressure.

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURES
8. (Continued)	F) Loss of control.	F) Avoid sudden application of the brakes, which may cause a skid. On steep grades, drag or drop the bowl to help control descent or stop in an emergency.
9. Refuel and park.	9. A) Struck by equipment, 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.
	B) Slips and falls, clothing caught on control levers or other projections.	B) Dismount scraper (see Job Procedures 2. A-B). DO NOT JUMP. Check surrounding area for loose material and slick spots.
	C) Fuel on skin and in eyes.	C) 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 scraper 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.

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURES
9. (Continued)	F) Collision, runaway equipment, traffic obstruction.	F) Park only at designated parking areas and always set brakes. Avoid parking on inclines or haulroads. If necessary to park on an incline, turn wheels into bank and/or block securely. If parking on a haulroad is required, pick the safest place.
	G) Unsecured raised equipment, runaway equipment.	G) Lower scraper bowl to ground and fully retract ejector. 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.
	I) Struck by other equipment.	I) Observe parking area for other moving equipment before leaving scraper. Make other operators aware of your presence.
	J) Slips and falls, clothing caught on control levers or other projections.	J) Dismount scraper (see Job Procedures 2. A-B). DO NOT JUMP. Check surrounding area for loose material and slick spots.
	K) Engine damage.	K) Shut off rear engine if applicable.
	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.

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURES
10. Performing 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 have not been 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, or from, a raised piece of equipment, securely block in place. Remove ignition key to prevent scraper 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 or bowl 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.