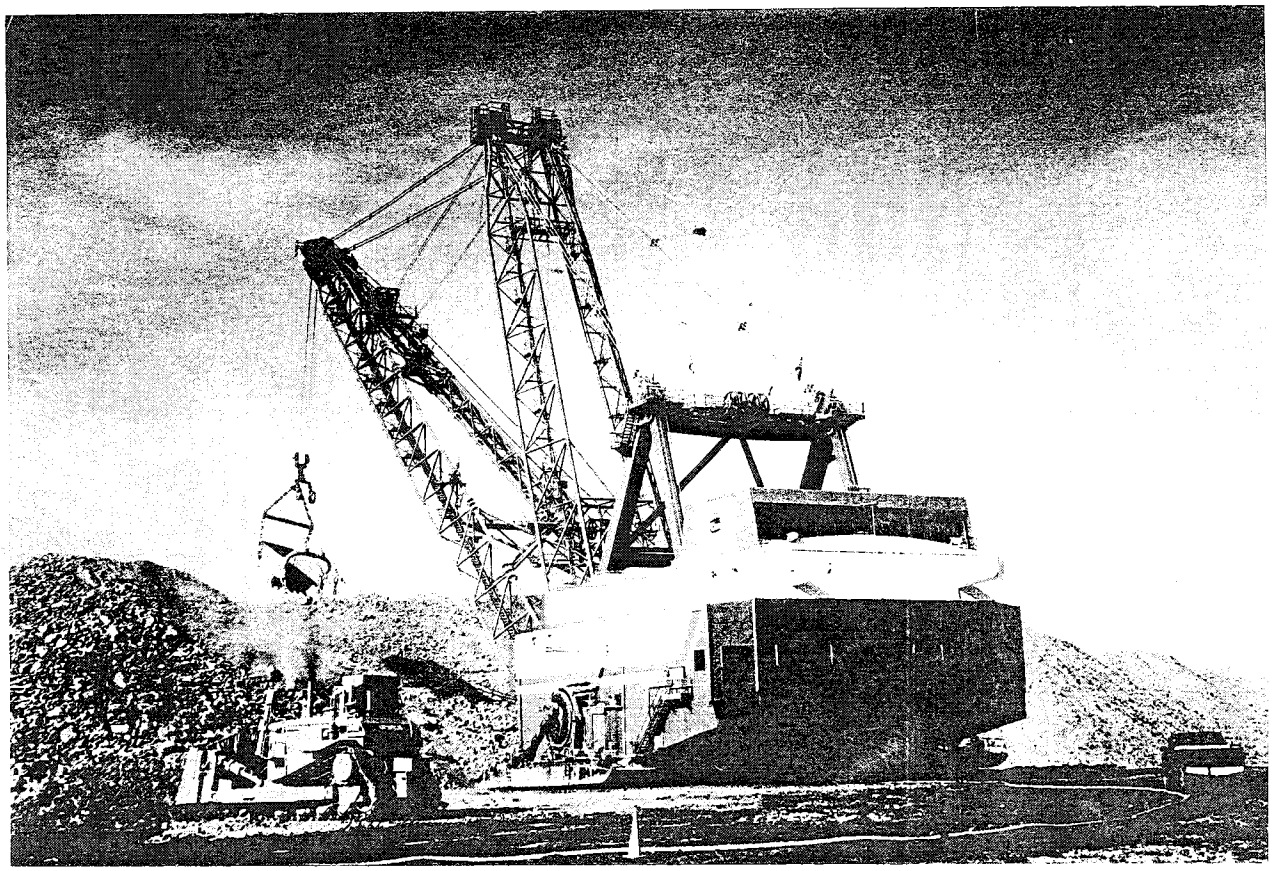
MODULE NUMBER 9
OF
INSTRUCTION GUIDE NUMBER 43

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

DRAGLINE OPERATION



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

Draglines are used in surface metal and nonmetal mining for overburden and ore removal, and for reclamation. Many different sizes of draglines may be used, depending on the type of operation and application.

Accidents relating to dragline operation most often result from slips and falls, being caught in or struck by moving parts, and standing or walking near the machine while it is in operation.

Slips and falls occur most often during maintenance, repair, or cleanup, and when mounting and dismounting the machine. Miners are most often caught or struck by moving parts during greasing or oiling, or when performing maintenance or repairs. Injuries to persons standing or walking near the machine often occur when persons are in the area of the dragline, and the dragline operator is unaware of their location.

The basic job steps included in this module are:

1. Conduct walk-around inspection of dragline and work area.
2. Mount and dismount.
3. Conduct on-board inspection.
4. General operation.
5. Shutdown procedure.
6. Perform repairs and maintenance.

Several of these procedures apply to the oiler and groundman as well as the dragline operator.

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, snug fitting 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 inspection of dragline and work area.	1. A) Personal injury, unsafe equipment or work area.	1. A) Visually inspect machine and work location for defective equipment and/or unsafe conditions prior to operation. Report any unsafe conditions to your supervisor and correct all defects.
	B) Electrocution, burns, equipment failure.	B) Visually inspect trailing cable for cuts, abrasions, and other damage, and proper installation (electric draglines). If inspection requires handling the cable, power must be off at switch house, or proper protective equipment (insulated hooks, tongs, ropes, or slings) must be used.
	C) Fall of material or overturning machine.	C) Inspect highwall, spoil and pit conditions. Be sure dragline is on solid ground and area is as level as possible.
	D) Striking personnel or damaging equipment with dragline.	D) Be aware of traffic patterns of equipment and personnel working in the immediate area of the dragline. Communicate with fellow workers before operating dragline. Warning signs are recommended to prohibit unauthorized persons from coming near the dragline.

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURES
1. (Continued)	E) Equipment damage or malfunction.	E) Check for oil leaks, gear wear or damage, loose or damaged crawlers or rollers, tub cable hooks, lubrication of gears and rollers, lower lights, signal devices, and unusual conditions.
	F) Falling or flying objects, machine failure.	F) Inspect bucket, drag ropes, sockets, drag chain, sheaves, boom cables, and boom structure for any damage or unusual wear.
	G) Slips and falls.	G) Be especially careful of ruts, uneven ground, and frozen ground. Make sure all steps, ladders, handrails, handholds, walkways, etc., are in good condition and free from oil, grease, mud, snow, and ice. NOTE: Slip resistant flooring is recommended in walkway zones.
2. Mounting and dismounting.	2. A) Slips, falls, caught between dragline and other machine.	2. A) Use caution when mounting or dismounting. Do not get on or off until the operator is notified and the dragline is stopped. Never get on or off a moving machine.
	B) Slips and falls, caught on projections.	B) Use steps, ladders, handholds, and handrails provided for mounting and make sure they are in good condition. Keep both hands free for climbing.
	C) Rock fall, caught between dragline and other machines.	C) Never walk or stand between the dragline and the bank, highwall, spoil, or other nearby machines while mounting.

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURES
2. (Continued)	D) Clothing caught on control levers or other projections, slips and falls.	D) Wear snug fitting clothing and keep boots, steps, ladders, and walkways free from oil, grease, mud, ice, and snow.
3. Conduct on-board inspection.	3. A) Equipment movement and/or failure, stuck or inoperative controls, poor visibility.	3. A) Check operator's cab. Make sure all controls are in the neutral position, brakes set, and bucket lowered to the ground. Make sure cab is free from debris, etc., and windows clean.
	B) Caught in or struck by moving parts.	B) Make sure all guards and safety devices are in place and in good condition.
	C) Slips, trips, falls, fire hazard.	C) Check decks and house area for uncovered openings, slipping, or tripping hazards, and accumulations of flammable or combustible material or liquids. Practice good housekeeping.
	D) Fire hazard.	D) Know location and operation of fire extinguishers. Check extinguishers (including automatic systems) and make sure they are fully charged and operable. Don't smoke or use open flame sources around combustible or flammable liquids or materials.
	E) Caught in, or struck by, moving parts.	E) Do not lubricate any moving part unless guarding and extended fittings are provided, which prevent access to hazardous moving parts.

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURES
3. (Continued)	F) Fire and/or explosion hazard.	F) Keep all compressed gas cylinder tanks secured and keep covers in place. Keep all compressed gas cylinders, hoses, torches, and regulators free of grease and oil. Do not store this equipment in the same enclosed area where flammable or combustible liquids are stored.
	G) Electrocution, burns, equipment failure.	G) Be sure all electrical equipment (switches, breakers, controls, panels, guarding, etc.) is in proper operating position and in good condition. Never perform any electrical work or enter any energized electrical panels or cabinets unless you are a qualified electrician. Be sure to lock out and tag the equipment or circuit.
	H) Boom or gantry failure, rope failure caused by sheave failure, excessive rope wear.	H) Inspect boom, boom pockets, gantry, and "A" leg for cracks, breaks, bends, excessive wear, missing parts, or any other structural damage. Check point sheaves and saddle blocks for damage or excessive wear.
	I) Rope failure.	I) Check all cables for broken strands, loose sockets, or any other damage which could cause breakage or failure. Periodic nondestructive testing of sockets is recommended.
	J) Trips and falls.	J) Check all steps, ladders, handrails, platforms, and walkways for cracks, corrosion, damage, or any deterioration.

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURES
3. (Continued)	K) Potential hazards that remain uncorrected.	K) Report and, if possible, repair any defects or hazards found during walk-around or on-board inspections. Do not use machine with uncorrected safety defects. If the dragline is unsafe and removed from service, tag it to prohibit further use until repairs are completed.
4. General operation.	4. A) Striking or catching other personnel.	4. A) Sound an audible alarm prior to starting dragline in motion, after repairs, or after being idle.
	B) Personal injury, lack of communication.	B) By visual observation or verbal communication, make certain machine crew (oiler/groundman) and all other persons and machines are clear before starting. Be sure the machine crew reports to you throughout the shift, so that you have a general idea of where they are at all times.
	C) Machine or control malfunction.	C) Make sure air pressure is at proper operating range. Check out motions of machine and all controls, limits, and warning devices. Check all brake systems. Stop machine if you feel or see any unusual response or hear any abnormal sounds.
	D) Personal injury, inefficient operation.	D) Clearly understand any work assignment before starting. Make certain machine crew and others know and understand all signals.

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURES
4. (Continued)	E) Unsecured raised equipment, injury from sudden machine movement when power is restored, equipment damage.	E) In the event of a power failure, move all brake switches to set position, place other controls in the neutral position, and secure the machine's position until power is restored.
	F) Personal injury, machine damage.	F) When operating and/or moving dragline, be alert for pit elevations, highwall, and spoil conditions, faults, clearance, traffic, machine crew, other equipment, and trailing cables. Keep dragline on good sound footing.
	G) Injury or equipment damage from fall of material.	G) Never swing bucket over workers, vehicles, machines, or trailing cable. Do not operate in the presence of anyone who could create a hazard or be endangered.
	H) Equipment damage, overturning.	H) Never suddenly set brakes while swinging, except in an emergency. Avoid jerking and abrupt motions. Avoid off-center bucket loading and twists.
	I) Fall of material and/or bucket.	I) Do not suspend a loaded or empty bucket in the air, with the brakes set, for long time periods. Lower to ground when not in use.

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURES
4. (Continued)	J) Ground failure, rock fall.	J) Observe condition of highwall and spoil banks at all times. When freezing, thawing, rain, etc., have created a potential highwall or spoil bank failure condition, immediately notify crew, others working in the area, and your supervisor. Use machine's audible alarm signal to warn personnel of this immediate danger if necessary.
	K) Ground failure, rock fall.	K) Loose hazardous material must be stripped for a safe distance (10 feet or more) from the top of pit or quarry walls, and loose unconsolidated material must be sloped to the angle of repose. Leave highwall as safe as possible before moving up. Be aware of caving edges or overhanging banks.
	L) Explosion hazard.	L) Be alert and observe blasting activities. Do not run over loaded holes. Be aware of any misfires in shot rock, bench, or highwall.
	M) Striking other machines/vehicl es with machine or falling material.	M) After being notified, allow sufficient time for vehicles or machines to pass by dragline before resuming normal operations.
	N) Fall of material.	N) Do not work between machines and the highwall or spoil bank where it may hinder your escape from falls or slides.

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURES
4. (Continued)	O) Electrocution, burns, cable damage, strains and overexertion.	O) Protect trailing cable from damage. Never carry or move cable with bucket unless slings are used. If energized cable must be moved manually, use proper protective equipment (insulated hooks, tongs, ropes, or slings). Keep kinks, twists, and short bends out of trailing cable. Don't pull long lengths at one time. Take several loops to minimize strain on cable. Don't run over power cables.
	P) Electrocution, burns.	P) Do not make or break trailing cable connections until the power is off, and key is removed from interlock. Do not perform electrical work unless you are qualified. Maintain good communications with all concerned when taking power off or placing power on machine.
	Q) Electrocution, burns, machine damage.	Q) Never work or swing boom within a minimum distance of 10 feet from any energized overhead power line.
5. Shutdown procedure.	5. A) Personal injury, equipment damage.	5. A) Park dragline on firm ground in a position where it does not create a traffic hazard and is not subject to damage by slides, falling material, etc.
	B) Fall of equipment, machine damage.	B) Place bucket on ground firmly and release cable tension.

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURES
5. (Continued)	C) Injury or equipment damage if machine moves when energized.	C) Place all controls in proper position. Make sure all brake controls are in the set position.
	D) Slips, trips, and falls, caught between ladder and other equipment or obstruction.	D) Do not permit anyone to get on or off the dragline while it is in motion.
	E) Slips, trips, and falls.	E) Dismount dragline (see Job Step No. 2).
	F) Hazards due to lack of communication.	F) Communicate with fellow employees and supervisor at end of shift. Notify of any hazardous conditions, machine malfunctions, etc.
6. Performing repairs and maintenance (if applicable).	6. A) Personal injury from improper procedure.	6. A) Do not attempt repairs or maintenance you do not understand and have not been trained to perform.
	B) Caught 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 locked out and tagged and blocked against motion, and all raised equipment lowered. If necessary to perform work on top of, under, around, or from a raised piece of equipment, block or mechanically secure the equipment to prevent accidental rolling, falling, or lowering.

SEQUENCE OF BASIC JOB STEPS	POTENTIAL ACCIDENTS OR HAZARDS	RECOMMENDED SAFE JOB PROCEDURES
6. (Continued)	C) Fall of person.	C) Do not climb boom, gantry, or "A" leg while dragline is in motion. Use safety belts with lanyards in elevated positions outside work platform or where there is a danger of falling.
	D) Fall of hoisted loads or equipment.	D) Do not overload hoisting or lifting device. On hoisted materials that require steadying and guidance, use taglines.
	E) Personal injury.	E) Plan any work to be done and maintain good communications. Know and observe safe work practices. Inspect tools and maintain in good condition.

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.